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VOLUME 100 MAY 1960 NUMBER 5

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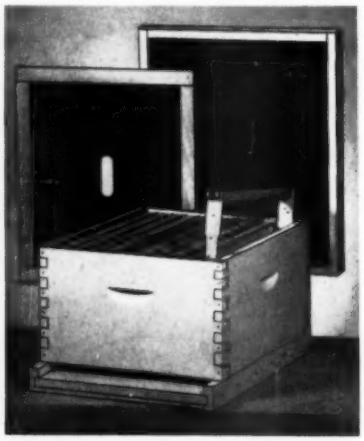

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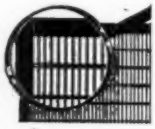

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The American Bee Journal
Hamilton, Illinois

Vol. 100, No. 5 May, 1960

Editor—G. H. Cale
Associate Editors—M. G. Dadant, Roy A. Grout

Published monthly at Hamilton, Illinois. Entered as second-class matter at the Post Office, Hamilton, Ill. In the United States, and Canada, $2.50 a year; two years, $4.50; three years, $6.00. Foreign 50c a year extra. Subscription stopped at expiration date printed on wrapper. Available on microfilm at moderate prices by writing to University Microfilms, Ann Arbor, Michigan.

THE RISE TO BETTER BEES

by DR. G. H. CALE, JR.

We could speculate at length, but unsuccessfully, about the date of the original introduction of the honey bee to the Western Hemisphere. It is certain, however, that the honey bee is definitely an importation to this hemisphere and did not exist in this area of the world prior to the settling of the Western Hemisphere in the 16th and 17th centuries. It is true, that a small stingless variety of honey producing bee exists in Central and South America, however these species differ quite radically from the honey bee as we know it. The American Bee Journal for July, 1866, carries an article by Professor A. Gerstaker of Germany, pointing out that the honey bee was brought from Europe with the first settlers. The Indians of the North American area had no word for honey bee in their language, and therefore called them a white man's fly, considering their approach indicated the approach of the settlement of the whites.

Certain it was, that these original bees of the early settlers were the common black bee—sometimes referred to as brown bee—of Central Europe. It is interesting to note that attempts to improve the honey bee of this country fairly well paralleled the other major improvements and developments of beekeeping and beekeeping equipment in this country. Within a relatively short span of time the beekeeping industry was presented with Langstroth's movable frame hive, the Bingham bee smoker, Johannes Mehring's comb foundation, and finally the introduction to this country of improved strains of Italian bees to take the place of the common black bee that had held sway until that time.

It is very probable that the development of the movable frame hive hastened the change-over from the common black bee to the Italian bee. However, this change-over was not rapid, since it started approximately in the 1850's and did not proceed at a very rapid pace until the early 1900's.

It is easy to imagine that the Italian bee, being quieter on the combs and more gentle to handle, was indeed an improvement over the cross, flighty temperament of the common black bee. The Italian proved so much superior to the black bee that it quickly became the popular bee of this country. The plague of European foulbrood which hit this country in the early 1900's added an additional boost to the Italian stock, for by comparison with the common black, the Italian was more or less resistant to this disease.

There have been minor amounts of importations of both the Caucasian and the Carniolan bees to this country. They have never gained the popularity of the Italian stock, but in all fairness to these two races it should be pointed out that very few extensive and fair trials have been made of either race.

Certainly attempts were made over the years to breed for certain characteristics in the bee, but these were little more than formative ideas at best. In the world of science it was not until the year 1900 that Mendel's laws of heredity were re-discovered and made available to the world. Even then—and continuing up to this present date—many workers in the field of the honey bee either knew nothing about these laws or ignored their existence.

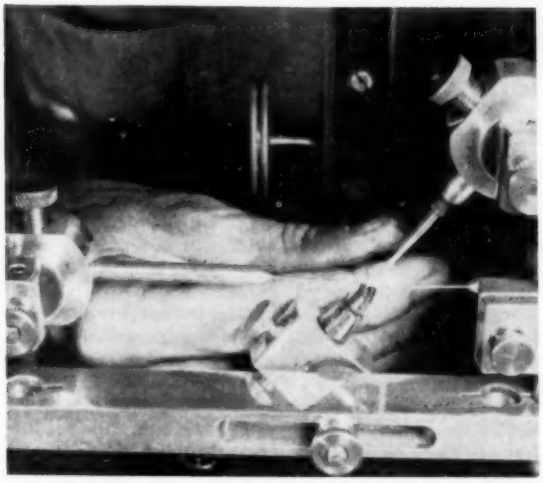
It is significant that the first major breeding effort of a sustained and continuing nature was started under the auspices of the American Bee Journal and Dadant & Sons. In the early 1920's G. H. Cale, Sr. and H. C. Dadant were engaged in observations of disease resistance in the honey bee. It was soon apparent that some control of mating would be necessary to breed for this important trait. Consequently, when Dr. Lloyd Watson, of Alfred, New York, started his work with perfection of artificial (instrumental) insemination techniques, he was supported by both of the organizations named above. Because of necessary refinements in the insemination technique (refinements that were to come at a later date) these two men were unable to employ this powerful tool in their breeding work.

By the spring of 1932, however, they had managed to accumulate in one yard colonies from widely separated sources that had survived wholesale infection of American foulbrood in their locale. In 1935 a cooperative testing and breeding program was established at the farm home of F. C. Pellett, Field Editor of the AMERICAN BEE JOURNAL. Cooperating with Dr. O. W. Park of what was then the Iowa State College of Agriculture, the researchers then set about to find out if the characteristic of disease resistance was inherited.

The results of this cooperative effort have been written up many times both in the AMERICAN BEE JOURNAL, as well as in extension bulletins and research papers of the Agricultural Experiment Station at Ames, Iowa. It was shown that resistance was definitely inherited. Later, this modest beginning was enlarged to include many other cooperators.

About 1940 the cooperative portion of this breeding work came to an end and the cooperating parties split up into three separate units—each of which has continued until the present date. These units were and are: Iowa State University (formerly, Iowa State College); the Division of Bee Culture, of the U. S. Department of Agriculture and Dadant & Sons, of Hamilton, Illinois. It is, perhaps, a tribute to the men and organizations concerned that over the years there has been and continues to be the greatest degree of cooperation and exchange of information between the men actively engaged in breeding work.

In the late 1930's and the 1940's a significant development was taking place in the development of the instrumental insemination technique. Working in the Division of Bee Cul-



Roberts-Mackensen apparatus for queen bee insemination.

ture, W. J. Nolan, Dr. O. Mackensen, Dr. W. C. Roberts, and Dr. H. Laidlaw improved the insemination instruments and our knowledge about the queen's anatomy until, in 1944, instrumental insemination became a practical technique and a powerful tool available to all who wished to study inheritance in the honey bee. (Dr. Laidlaw now continues his research in inheritance at the Univ. of California).

Now the tools were available, heredity was well understood (although not yet well understood in the honey bee), and the stage was set for major efforts at improving the bees of the country. There is neither time nor space available here to go into the contribution of each to this field of improvement. The work of Dr. O. W. Park has been carried forward to this date by Dr. W. C. Rothenbuhler of Iowa State University (Science Editor of AMERICAN BEE JOURNAL) who continues to make contributions to disease resistance as well as to many other aspects of inheritance in the honey bee. Dr. Mackensen and Roberts have made additional contributions to improvement of instruments; but of even greater importance, made the first serious studies into hybridization as a tool in bee breeding as well as making further contributions to important inheritance studies in the honey bee. Dadant and Sons, with the help of all the men and organizations previously mentioned, have continued their active interest in inheritance and breeding in the honey bee—an interest that has resulted in the present Starline and Midnite hybrids.

Today, then, we find ourselves on the verge of a new era in bee breeding —THE HYBRID ERA. HYBRIDS! We had them in the past—they were crosses between black and Italian, and everyone knows that such crosses are not good! Well, let's try again. Let's go back to the AMERICAN BEE JOURNAL for August, 1949, page 391 and quote as follows: "Hybrid—the offspring of the union of a male of one race, variety, species, genus, etc., with the female of another. In genetics (HEREDITY), however, THE TERM HYBRID IS COMMONLY APPLIED TO ANY OFFSPRING OF PARENTS DIFFERENT IN GENETIC MAKE-UP." Now then, what have we said? Simply this: If we have a line of bees that inherits bad temper; and another line of bees that inherits gentle temper; and if we cross these two lines together—the result is a HYBRID BEE. It doesn't signify that we have crossed races of bees, but simply that we have united two lines of differing inheritance characteristics. Of course, in hybrid breeding, a bad tempered bee would never be used even for crossing purposes.

In summary then, the honey bee of our country has gone from original black of Central Europe, to imported Italians in quantity, to minor trials of imported Caucasians and Carniolans, and finally to the early phases of scientifically controlled hybrid breeding—a phase that will add immeasurably to the welfare of all beekeepers as it advances year by year.

Future

It has been said that only the fool or the foolhardy dare to predict the future. Perhaps it would be safer to predict the bees of the year 2000, but I think that certain patterns are developing, that point the way to even the immediate future in bee breeding. So, at the risk of being fool or foolhardy, let us take a look at the future.

Certain known inheritance barriers in the honey bee rule out the so-called line breeding approach that has been used in some of our domestic animals. This leaves the hybrid approach as the only practical way to improve our bees in the foreseeable future. Indeed, barring some drastic inheritance discovery, hybrid breeding in the honey bee is with us for all time.

To a great extent the bees of the future will depend upon the development of and uses made of beekeeping in this country and throughout the world. Expanding world population may continue to encroach upon the "wild" territories to the extent that large-scale honey producing units as we now know them may become things of the past, at least in our country. Decrease in insect populations may become so severe that the major use of the honey bee might become a means of controllable pollination. Fortunately, pollination studies are already in progress and it is fairly safe to assume that pollination-type bees are a distinct possibility with hybrid breeding.

Vast areas of the world, however, do not readily lend themselves to other agricultural pursuits. "Wild" areas will continue, and these areas will become the major sources of man's oldest sweet—honey. Therefore, ever-increasing honey production capabilities will continue to be a major demand for new and improved hybrid bees. A conservative estimate for the future indicates that honey bees will be bred, using hybridization techniques, that will be at least 150% better than the bees we are using today. Indeed, the next ten years should see at least a further 25% increase in producing capabilities.

A probable development, and not too far in the future, is the hybridization of a bee designed especially for the enthusiastic hobbyist. There is already a tendency pointing to the development of such groups and an easy-to-handle, gentle bee may become a distinct possibility.

A Technique for Studying Genetics of Colony Behavior in Honey Bees*

Walter C. Rothenbuhler

Department of Zoology and Entomology,
Iowa State University, Ames, Iowa

A colony of honey bees is neither an individual nor a population in the usual sense of either term. Instead, it is a sort of a family, composed of a mother, several fathers (now deceased), their daughters, and her sons. Several fathers are involved because the queen mates naturally with several drones as shown by the work of Roberts, Triasko, Taber, Woyke, Alber, Peer, Ruttner, and others (Literature citations in Ruttner, 1956; and Taber and Wendel, 1958).

To carry the family idea somewhat further, while focusing attention only on the worker bees and their origin: A colony is a "super-family" composed of a number of "subfamilies." The queen is the mother of the superfamily, but each drone with which she mated is the father of only one of the subfamilies. Size of subfamilies may differ, one from another, and change from time to time. How inheritance of characteristics should be studied in a bee superfamily and how the subfamilies influence one another are neglected matters of surpassing interest.

It so happens that many of the characteristics of practical importance to beekeepers are behavior characteristics of the whole colony, such as yield of honey, pollinating activity, use of wax, comb construction, temperament, swarming tendency, etc. Furthermore, it is well known that honey-bee races, strains, and colonies may differ widely in these characteristics. For two broad reasons, genetic analysis is desirable. An understanding of the genetic basis of these differences would facilitate the work of the bee breeder and contribute to basic understanding of animal behavior.

Common genetic techniques are applicable to a random mating *population* or to the *individuals* from specific matings. No technique yet devised is useful in the genetic analysis of such an unspecified assemblage of half sisters as is found in a bee superfamily. One is not, however, left helpless in the face of need for genetical studies of colony characteristics. In fact, by utilizing artificial insemination and taking full advantage of the haploid nature of drones, one can use conventional genetic techniques to study the rich display of behavior differences found in bees.

To analyze the genetic basis of any colony-behavior characteristic, an investigator must treat colonies as individuals. A colony cannot be treated meaningfully as a genetic individual unless its components—its worker bees—are genetically identical (or approximately so). An animal with two genetic types of cells, such as a genetic mosaic or a gynandromorph, is a genetic anomaly in the determination of genetic ratios. A colony composed of bees having different genetically determined behavior patterns is an equal genetic anomaly and cannot be classified, even though, in a proper experiment, this sort of colony is well worth studying (Moure, Nogueira-Neto, and Kerr, 1958; Sakagami, 1959).

To obtain a colony with genetically uniform worker bees requires two steps. First, the queen must be highly inbred, homozygous at most loci, so that she produces eggs that are genetically alike for most characteristics. (She can never be completely homozygous because of the nature of the sex-determining mechanism in bees—Mackensen, 1951, 1955; Rothenbuhler, 1957). Second, this highly inbred queen must be mated by artificial insemination to only one drone so that her eggs will be fertilized by genetically identical sperms. The resulting colony will consist of only one subfamily composed of worker bees that are nearly identical genetically. Such a colonly is not a genetic anomaly, but from the standpoint of colony behavior characteristics is an individual.

The unique value of the *inbred queen-single drone* mating technique became apparent in 1958 when drones from F_1 hybrid queens were backcrossed to parental-line, inbred queens in a study of the genetics of hygienic, or disease resistant, behavior (Rothenbuhler, 1958a; 1958b). It was possible to classify the resulting colonies with respect to the behavior characteristic in question. Beyond this, one could see other behavior differences between colonies in such characteristics as stinging behavior, tendency to buzz when hive was opened, and construction of burr comb. Such differences were greater, in the opinion of Victor C. Thompson as well as the writer, than anything seen previously in other groups of colonies. The tremendous genetic variability in a hybrid queen's gametes (drones) was reflected in tremendous colony variation when the gametes were tested singly on a uniform genetic background.

It is suggested that backcrossing drones from hybrid queens, singly, to inbred queens, may be used for the following purposes:

(1) *To study the nature and range of variation of behavior possible in bee colonies.* If a colony is composed of only one subfamily, it expresses the full intensity of each genetically determined behavior characteristic consistent with the physical environment, but unmodified by social environmental factors imposed by bees of other subfamilies.

(2) *To analyze the genetic and environmental bases of behavior differences.* If all bees in a colony are genetically similar, the colony is a genetically meaningful entity. Colonies may be classified to learn genetic ratios, they may be divided to investigate physical environmental influences, or they may be combined under controlled conditions to study social environmental factors.

(3) *To identify and isolate superior genotypes by gamete selection.* As has been pointed out previously, gamete selection is particu-

(Please Turn to Top 198)

*Journal Paper No. J-3845 of the Iowa Agricultural and Home Economics Experiment Station, Ames, Iowa. Project No. 1332. The research which provided the data upon which this paper is based was supported in part by a research grant E-599 from the National Institute of Allergy and Infectious Diseases, Public Health Service.

The Characteristics of
THREE RACES OF BEES

The Italian

The so-called Italian bee has been cultivated from time immemorial in the northern portions of Italy and differs from the common honey bee only by its color and markings. In the workers the first three upper segments of the abdomen are of a bright orange color although the lower margin of the third segment is black. While young, the color is brighter, becoming darker as the bees increase in age.

The Italian queen has not only the orange colored segments but the yellow predominates in all the other segments. The drones have the first three segments bordered with orange and have orange colored spots besides.

The Italian bee is not a distinct race but a variety of the common honey bee. The Italians are bold champions and brave defenders of their hives. They are much more vigilant and far less liable to be caught "napping" than common bees. We might infer likewise a greater propensity to rob and this disposition results from an inordinate desire to accumulate stores of honey. It manifestly presupposes the Italian to have a greater degree of industry, also they expel their drones early which has an obvious influence on the preservation of stores. Another important quality of the Italians is their mild tractable disposition.

(By Rev. Geo. Kleine, A.B.J. 1861 who is here describing the original Italian importations. The so-called American Italian is an altogether different creature.)

While visiting Prof. Mona, I saw Italian bees in their native home. His assistant, Mr. Uhle from Hanover, Germany, opened several colonies to show me a beautiful yellow queen and a darker one with only some narrow yellow bands. The worker bees in either case were highly colored and fully marked. According to Prof. Mona, the darker queens are the ones best considered and customers often prefer and order the darker queens which they think are hardier and more prolific. In Germany, however, the brighter queens are preferred. Between nine o'clock in the morning and ten in the evening, we visited a number of apiaries and examined the bees without detecting the least variation in color or finding a single black bee.

At home it struck me that my colonies with bright yellow workers are on the average less productive than those with darker colored workers. It seems to me, therefore, that beekeepers who desire to introduce the Italian race for the greater productiveness, would do well to give preference to the darker hued which are most esteemed in their native land.

(Adam Grim, A.B.J. Nov. 1867)

At the German Beekeepers' Convention at Nuremberg, Mr. Kaden stated that "it must be conceded that the Italian bees have some undesirable qualities. First, an aptitude to change their queens." He had known a colony to make such a change three times in the course of a summer, without swarming. "Second, they show a strong propensity to build drone combs and thirdly, Italian colonies are often less populous in spring."

(Samuel Wagner, A.B.J. April 1870)

The queen of the Italian race is long and slender and very symmetrical. The whole abdomen except the last segment is of a beautiful golden color. The color of queens varies somewhat, some being darker than others, but all produce fine workers. Her movements among the bees on the combs is well directed and graceful and the queen is easily found on the comb. I have often seen the queen lay while still holding a comb in my hand. Italian queens keep their colonies strong. They cast larger and earlier swarms.

When a queen is pure and purely mated the workers have three yellow bands around the abdomen. They possess agility and strength in a marked degree, are excellent nurses, always keeping the brood up to the highest point. They are very quiet on the combs and do not fly off or crawl. They are very easily handled during the honeyflow. When robbers are around, however, in the fall, they become fierce and defend their stores well. They also defend their homes in a superior manner particularly against the wax moth. If properly cared for, a small number of workers with a good queen soon builds up into a powerful colony.

(Dayton E. Barker, A.B.J. 1889)

The Carniolan

For the introduction of Carniolans Frank Benton deserves the gratitude of all beekeepers. The most notable trait about them is their freedom from the disposition to rob and for their vigilance in guarding their own hives. With 200 nuclei colonies, daily exposure of their combs, and a poor honey season, it is remarkable that I have not had a single colony robbed. Such freedom from robbing never happened to me when I had Italians. They are better honey gatherers than the Italians and as for gentleness, I have little use for the smoker. Many colonies may be handled as if they were so many flies.

(Dr.S.W.Morrison, A.B.J., 1888)

I began the season of 1888 with 25 colonies, 20 Carniolans, 5 Italians. I increased to 30 in a very poor season. The Carniolans were the only colonies that gave me any surplus. They filled their brood chamber also. I never saw bees cap their honey so rapidly and with such snowy whiteness.

The Carniolans have a little more propensity to swarm and maybe this is because they are more prolific and so need to be managed in a different way. Give them plenty of room and they will make use of it.

(F.A.Lockhart, A.B.J., 1889)

The reputation of the Carniolan for amiability, activity and vigor, and the ability to withstand cold weather, seems to give it a superior excellence. There is only one disadvantage and that is the tendency to overswarming. However, as overswarming results either from overcrowding or some discomfort, it may, in the hands of the wise beekeeper, be no serious objection. If the Carniolan is so prolific that it speedily fills the hive with bees which in turn leads to swarming, surely that would be a recommendation.

(Turn the page please)

During the latter part of July I visited the apiary of Frank Benton and saw a large number of Carniolans from imported queens. I was very pleased with their appearance. Their very large bodies and light colored rings formed by the gray hairs, make them very attractive.

Mr. Benton informed me that the Carniolans rank with the Italians in honey producing. He says the comb is as white as that of black bees since they leave a little space between the honey and the capping. According to Benton, pure Carniolans will never have a show of yellow bands unless there is some mixture with Italians.

(Prof.A.J.Cook, A.B.J. 1899)

I have 80 colonies and I am preparing to winter them in the cellar. I will say of my Carniolans, that the queens are larger and more prolific than Italians. The workers, larger, very gentle, and easily handled without smoke. They stick to their combs so quietly that a comb covered with bees could be taken to the house and the queen removed and the comb replaced without dislodging a half a dozen bees. They are readily distinguished by the white band which, when the bees are in the shade, give them a silvery gray appearance. That at once discloses their identity. With me the Carniolans are better honey gatherers and their combs are whiter and they use wax mostly in place of propolis.

(Judge Laurens Hawn, A.B.J. 1889)

The purest type of the Carniolan race is dark gray, or steel colored, wholly free from yellow bands. Whenever yellow is found it is to be taken as an evidence of Italian blood. Carniola is located in the southern part of Austria, near the Adriatic Sea, and is only separated from Italy by a single narrow province. The line between this province and Carniola follows a range of mountains extending in a southerly direction from the main part of the Carnic Alps. The history of beekeeping in Carniola shows that a migratory system has been followed there for centuries. During buckwheat many thousands of colonies are brought by rail or wagon from all parts of Carniola toward the center of the province. I have seen a railway train with 5,000 colonies coming into the buckwheat fields. Some colonies are brought over the mountain range which separates Gorizia from Carniola, whose elevation is 1200 to 2500 feet. Bearing in mind that Gorizia borders on Italy and that its surface slopes toward the Italian line and the Adriatic, there is no mountain barrier to prevent a mixture of the bees in these districts and so it is easy to understand how the bees southwest of the Carnic Alps shade off or merge gradually into the Italians.

With these mixed bees more or less yellow blood has been brought into Carniola and in buying queens, I have always avoided those whose workers show any yellow or rust color. The bees offered for sale under the name of "Yellow Carniolans" or "Golden Carniolans" are just hybrids between the yellow races like the Italians, Palestinians, Syrians or Cyprians.

(Frank Benton, American Beekeeper, July 1891)

The Caucasian

Something more than twenty years ago my attention was called to these bees in Germany; they had been imported from the Caucasus but I was not much inclined to test them as I had my hands full with other races and those that I saw were not very uniform in markings. However, about two years ago I was in the apiary of the Rauchfuss Brothers, near Denver, and they spoke very highly of them. They had received some Caucasians that came directly from the Caucasus. So I was led to get some and I have been testing them.

I find them good honey gatherers. They look something like Carniolans that have been dipped in water and dried to give them a leaden tinged appearance. Yet they are easily distinguished. The body of the Caucasian is smaller than some bees and they are so tractable that anything one wishes to do with them can be done almost without smoke.

(Frank Benton, A.B.J. 1905)

There are two main sorts of the Caucasian bee. The typical bee for the Caucasus is the mountain gray Caucasian from mountain localities as Abkasia, Swanetia, etc. We find at Caucasus also a second kind, the yellow Caucasian. She lives in North Caucasus and in some southeastern parts of Transcaucasus, the valley of the Koora River. The yellow bee can be related, according to Gorbacheff, to the Persian bee. She has yellow or orange areas on the two or three bands of the abdomen counting from the thorax. The Lenkoran bee is especially yellow.

The mountain gray Caucasian is extraordinarily peaceable, laborious, tolerant of cold and rough wintering. The queen is very prolific and the colonies swarm moderately. They fill cells with honey much before they cap them and so the air left under the cappings gives them a more beautiful honey.

The yellow Caucasian is more sensitive to cold, likes to rob, makes many queen cells, swarm extensively, gathers less honey and is not so peaceable.

(A. S. Mikhailoff, A.B.J. 1927)

Honey production is the primary aim of most beekeepers. From my experience of seven years testing Italian and Caucasians under conditions in the intermountain region, it has been very apparent that the Caucasians show the greatest advantage when the going is toughest. In 1927, the worst in my experience at Laramie, Wyoming, the Italians just barely held their own, the Caucasians made a super of honey each. The brood rearing of the two races shows three significant differences.

1. The Caucasians build up more rapidly in spring and fall until the honeyflow, showing 22.6% greater production of bees for the period May 14 to July 15.

2. During the flow, the Caucasians start at once to cut down brood rearing, while the Italians come to their peak during this time.

3. The Caucasians start cutting down on active brood rearing faster during the end of the flow and completely halt it two or three weeks earlier than Italians.

It is very apparent that during the difficult build-up period of the spring and summer in the mountains, more rapid production by Caucasians is a distinct advantage. On the other hand it might be a liability under different conditions or at least no appreciable asset.

It is safe to say the Caucasians are the most gentle bees we ever handled at the University of Wyoming. And yet they can when badly crowded or disturbed resist furiously and always protect their hives with a force not even equaled by the average Italians. When they come out for business, they sting at once and bore right in and get it over.

From the standpoint of swarming, here at the University in Wyoming, there is little choice between the two races. Swarming has not been a problem with us so we cannot speak

with authority. Ordinary precautions of swarm control have been entirely adequate.

Caucasians are much more prone to build burr and brace combs than Italians. Beeways must be properly proportioned and crowding prevented or the hives will be logged down and combs stuck together. From this standpoint the Caucasians need more manipulation than the Italians. The beekeeper who neglects his colonies had better favor Italians. The producer of comb or chunk honey, however, will be delighted with the beautiful white cappings produced by Caucasians and if properly handled they are a better bee for this type of production.

Because of the supposedly excessive use of propolis, the Caucasians have been severely criticized. I have not seen this excessive propolization. True, entrances are contracted to a few one-beeway holes in the fall, cracks are plugged and misfit supers, tops or bottoms are glued up tightly, but properly spaced combs and correct bee space between other parts eliminate excessive propolization to the point where it is a nuisance.

As for wintering, the brood chambers are much more heavily provisioned with stores. They go into winter quarters with a smaller population of bees but come out in the spring stronger. Spring dwindling or delayed winter loss is uncommon with Caucasians but very common with Italians, and outright winter losses are much fewer. Too, they consume far less stores in winter.
(C.L.Corkins, A.B.J. 1933)

Cyprian and Carniolan Bees

by Charles Dadant
(THE ELDER)

Having read, in the bee papers of Europe, the favorable reports of a Mr. Cori, on the Cyprian bees, we resolved to get some queens from this Island. In consequence we wrote to our Italian correspondent to send an order for five queens to Mr. Cori, to introduce them in his apiary, and to send them with his queens to us. But Mr. Cori had too many orders to fill and was unable to send the queens. Besides, as we stated our preference for queens coming directly from Cyprus, that they may be of unquestionable purity; and as we had given *carte blanche* (full leave) as to the cost, our correspondent managed to get the address of an Italian gentleman living in Cyprus, and wrote him to send the Cyprian bee colonies.

The purchase of these colonies was very difficult. The bee-keepers there do not like to sell their bees; they think that if bees are sold, the remaining colonies will be dissatisfied and will quit the apiary. Yet, after some delay, five colonies were bought and sent.

When they arrived in Italy, all the combs were smashed and mixed in the broken *carthen* hives. A few workers were alive yet, but no queens. We will try again.

We had ordered, at the same time, some queens from Dalmatia, from Smyran and from Carniola. Our Italian correspondent was unable to get any of them, but the Carniolan; that we received in October, with a lot of Italians, three of these Carniolan queens were alive, out of the five sent.

These queens are very dark; as dark as the darkest hybrids. But they are very large.

In Germany the Carniolan bees are greatly appreciated, some think them more prolific than the Italian, and of course giving more honey. We will try them and report.

We have not seen their workers, for these queens were introduced for a few days, in the apiary of our correspondent and were sent accompanied with Italian workers. But if we are to judge of the workers by the look of the queens, they will resemble our hybrid two-banded bees.

As these queens were received for experiment, we have none for sale.

Sense and Nonsense

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Bees are variously affected by different colors. White blinds them, and black is disagreeable to them. Hence the front of a hive should not be painted white; and the beekeeper should not wear a black dress. Hives when ranged in a row on their stands, in close proximity to each other, should have at least their fronts painted of different colors.

A piece of the bark of an oak tree that has been struck by lightning, is selected by some beekeepers and nailed or fastened to a tree near the apiary, to attract and arrest issuing swarms, and induce them to cluster where they can easily be secured and hived.

Line fences divide property, and keep cattle and horses on their owner's land, but bees pay no attention to such divisional lines. The air is their highway, the sunshine their invitation to roam, and the flowers their banqueting halls. Happy, basking, smiling, buzzing, frugal bee! Cunning, stinging, robbing bee!

You never hear the bee complain,
Nor hear it weep nor wail;
But if it wish it can unfold
A very painful tail.

Not a single ounce of honey was ever wasted by bees since the world was made. You do not waste your honey by feeding, but only, as it were, pour it out of one pot into another; where you may find it whenever you want it, and not only so, but you find a gallon where you put a quart.

Commenting upon our friendly notice of the exhibit of A. I. Root at Columbus, he remarks thus: "How gratifying it is that editors of bee papers, unlike some other pursuits, can say kind things of each other, and not exhibit signs of jealousy." Sure enough. If the editors of the periodicals of an industry cannot be just, reasonable and friendly towards each other, they ought to "get out" and make room for those who will not be such fools as to be jealous. We hate "jealousy." The Bible truly says: "It is as cruel as the grave."

LLOYD RAYMOND WATSON

Father of Controlled Mating

by G. H. CALE, SR.

Dr. Watson designed the first equipment for the insemination of queen bees. Most of the equipment was adapted from materials at hand, like the wooden table to which the queen was strapped and the hand forceps. High skill was needed to use these materials.

For many years Lloyd Watson, originator of the apparatus for the instrumental insemination of queens, and I were inseparable friends. Both of us were employees at one time of the United States Department of Agriculture in the Office of Bee Culture under Dr. Phillips. Then the Office of Bee Culture was housed in a 3-story frame building with the Bee Culture offices on the lower two floors and living quarters on the third floor. Both Dr. Watson's family and mine were not living in Washington because of war conditions, and it seemed best for them to remain at home.

Lloyd and I had long talks about the breeding of queen bees and we both had the same thought that there should be some improvement in mating which would allow the industry to enjoy the use of vastly improved queens. Mating usually occurs on the wing and there is no control over this natural event.

Lloyd talked of all kinds of approaches to the problem of controlled mating. Later he returned to Alfred, New York, his home, where he was employed by Alfred University in the Department of Chemistry. He was a fine chemist with a graduate degree and later became head of the department. I stayed with the Bureau until coming to Hamilton to the Bee Journal.

During this interval Lloyd worked to gain some mastery over the problem of the insemination of queen bees. However, he found he did not have enough basic information so he went to Cornell University at Ithaca to study genetics and graduated with a Doctor's degree in that subject. He finally devised a crude instrumental setup for inseminating queens and demonstrated that they were at least partially inseminated by his method. However, there was a long road to go before instruments and technique could be devised for effectual instrumental mating.

About 1936 Lloyd called me to Alfred to confer with him and to take some part in the problem. His instruments were very crude. He used valve cores from automobile inner tubes to provide the plungers for his glass insemination tubes. He blew the glass tubes himself in his living room until he found that he could do a fairly acceptable job of producing the basic instruments. Then he only needed a binocular microscope and a stage on which to tie down the virgin queen and hand applied instruments for opening the ovaries while he manipulated his handmade plunger to introduce the semen. This was the first successful use of instruments.

I stayed with him about a month and finally learned enough about the technique to partially inseminate virgins myself and mail them back to Hamilton where George Watt, at that time my apiary manager, managed to get them introduced into colonies of bees. They laid about 25 to 30 per cent worker eggs, but no more. Everything else was drone.

I was very familiar with all the subsequent efforts that Lloyd made to bring about better insemination. He found out much about drone selection, about the use of the instruments and about the handling of virgin queens in the process of insemination, but he was never able to reach a high degree of worked brood from his skill.

Nevertheless this initial work excited the entire scientific world wherever bees were being studied. His discovery was the key to the most important research in the whole field of apiculture. Instrumental insemination gave to the beekeeper for the first time the power to select an individual drone for mating with an individual queen bee. It was the greatest single advance in bee breeding in the history of the industry.

The principle of his method still remains unchanged. It was simple. It involved the transfer of sperm from the drone to the queen with a micro-syringe and yet this simple process was the solution to a problem

The field laboratory at Dr. Watson's and the apiary. Hardly a modernized building but it served its purpose.

that had confronted beekeepers for ages. He was a dreamer of dreams and he could stick with his job of translating these dreams into the cold light of everyday life in spite of all difficulties.

All of Lloyd's earlier life seemed to shape him for his ultimate job. He graduated from Alfred University in 1905 and served as teacher and principal in a high school in Pennsylvania for three years. He was instructor of agriculture and chemistry at New York State School of Agriculture in Alfred from 1911 to 1918 and he was then made Extension Specialist in Apiculture at the Connecticut Agricultural College.

After his sojourn at the Division of Bee Culture, already mentioned, he became State Apiculturist in Texas before going to Cornell University to study genetics under Dr. R. A. Emerson. After his graduation he became Director of Research and Professor of Chemistry at Alfred University.

While at Alfred he began to work towards his crowning achievement. He developed an exprimental apiary and a laboratory at his home and with various foundation aids and help from the University and with help from unselfish assistants he carried on his research. Many students from this country and from abroad came to study and observe his methods.

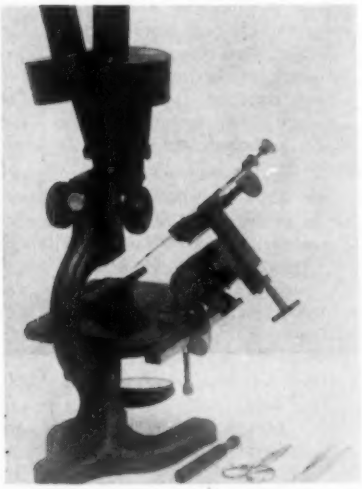
Dr. Walter Rothenbuhler, now at Iowa State University (also Science Editor of the American Bee Journal) studied with Dr. Watson. Dr. O. W. Park, Research Associate Professor at Ames, and Dr. Rothenbuhler in the summer of 1947 succeeded in devising a syringe with a detachable tip into which the plunger does not enter. From this design an eastern manufacturer produced a model which was tested and was found to be a definite advance over any similar instrument at the time.

Since then there have been many improvements in Watson's original apparatus. Probably the most substantial improvement was made by W. G. Nolan of the Office of Bee Culture, U.S.D.A. and his instruments are basically the same today as they were when he introduced them.

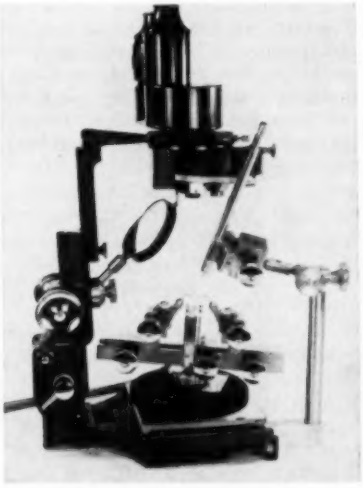
Two other improvements in technique were important in successful and speedy instrumental insemination. Dr. Mackensen, now at Baton Rouge, introduced the use of carbon dioxide as an anesthetic that not only quiets the queen during the process of insemination, but also speeds up the process of egg laying considerably, making it much easier to secure results rapidly.

Dr. Harry Laidlaw, University of California, also made an important contribution to the understanding of the physical formation of the queen when he discovered the almost transparent valve fold which obstructs the passage of instruments into the oviduct. A method has been devised to pull back this valve fold to complete insemination without injuring the queen.

This was the capstone and successful and rapid instrumental insemination had become a firmly established procedure. Now queen bees so "mated" perform in every way equal to queens mated naturally. With a better understanding of the methods of natural mating it has become possible to secure full insemination for a long period of time and finally to control mating to the point where bees can be pedigreed so that bees of the future can be said to be man made for any purpose whatever. In laboratories around the world, the Watson technique is being used so that the entire process of applied genetics is rapidly becoming understood. There is still much to learn, but the corner has been turned and we are now on our way.



A different view of the Watson equipment, with simple queen bed and home blown tubes and hand made plunger.



That simple equipment gradually evolved to this almost mechanically operated set-up.

Frank Benton

A Brief Sketch of the Life of FRANK BENTON

Student and Importer of Bees

by ALYMER J. JONES
ABJ Biographer

Frank Benton, an all but forgotten figure now, was at one time the "white hunter" of the beekeeping profession, and became Chief of Apiculture in the Dept. of Entomology at Washington at the turn of the century. He occupied a large part of his time both before and during his public service by investigating races of bees. He traveled much in this work, probably more miles than any other beekeeper before or since. There were two such journeys, twenty-five years apart. During the first argosy, Benton spent 12 years in residence abroad. He lived in many places never heard of then, and hardly known even now, all the while investigating new races and species of bees: Cyprians, Punics, Syrians, Caucasians, Carniolans, Apis Dorsata, Apis Zonata, Indica, Florea, and many, many others. He shipped them to all parts of the world. Benton was especially interested in the long tongue of the giant bee, Apis Dorsata and he tried to ship this species safely, but the attempt was unsuccessful. An account of this man's career sounds fabulous as indeed it was.

Frank Benton was born at Coldwater, Michigan, July 5, 1852. He was interested in bees from childhood, and pursued their study by attending and graduating from Michigan College of Agriculture.

In 1879 the Michigan Beekeepers Convention appointed a committee of three to look into the advisability of importing desirable foreign races. The three men were: President Cheney, H. M. Roop, and Frank Benton. The latter, although only 27 years af age, was a good linguist, well versed in bees' ways, both practical and scientific, and had enormous enthusiasm.

Shortly following Benton's appointment to this committee, D. A. Jones of Beeton, Ontario, organized and financed a venture to import Cyprians. He took into partnership young Benton. They both went abroad, but Jones soon came home, leaving his partner in Europe and the Near East to breed and export Cyprians and queens of other newly discovered races. Later Benton visited Ceylon, Java, and India in search of Apis Dorsata or the giant bee of India. After much difficulty, he obtained a few colonies. They were shipped to this country, but did not survive the voyage. One wonders how the giant bee could be hived. It builds one comb four or five *feet* in length. The beautiful worker bee is as large as an Italian queen. Colony populations run upward of a *half bushel* to the colony. Data on the effects of a sting would be interesting and probably frightening. Quite aside from the results, one can but admire Benton for his effort and bravery. If one has read Somerset Maugham's account of the difficulties of his travels in Ceylon, Java, and India in a much later day, one wonders how Benton was able to travel in those wild countries many years earlier and escape with his life.

Frank Benton, writing of this first journey which started in 1880, reveals a very romantic aspect of this trip abroad. It was also his honeymoon! To use Benton's own words:

> As the huge Atlantic liner Italy swung out into the broad Hudson, on the pleasant winter noon, the good wishes of many of the beekeepers of Canada and the United States went with a certain little group of three that stood on the main deck. The man of large form and good natured face was none other than our friend D. A. Jones of Canada. Near him was a "blushing bride" claimed by Frank Benton of Michigan, who stood opposite the two.

On this first trip, Benton visited noted beekeepers in England, Germany, Austria, Trieste, Egypt, Cyprus, and Syria. In the latter two places queen breeding yards were established. He then visited Palestine where colonies were purchased. Within three months of the start of this venture, Benton and his bride were left behind as Jones returned to Canada with samples of queens they had bred and purchased.

During the next three years, Benton visited India for Dorsata, followed by four years residence in Germany with not one but several trips to the East and two through Italy and Tunis. Four more years were spent in Austria breeding and exporting the Carniolans. Finally, Mr. and Mrs. Benton returned to America after twelve years abroad, and as Benton put it, "There were with us a couple of 'little Immigrants' who had joined our company and whom we had named Ralph and Zoe." Ralph later became a Professor of Entomology at the University of California and accompanied his father on a second trip abroad 25 years later.

On June 3, 1905, Frank Benton again sailed for Europe, this time as a representative of the U. S. Dept. of Agriculture, having been made Chief of Apiculture in the Dept. of Entomology. Dr. Phillips was left acting-in-charge. Benton reported the government appropriation for Apiculture for that year to be $50,000. (This may well have been much larger for those days than the current appropriation is under conditions today.) He largely duplicated his first journey except that he did not tarry for years in any one spot. Again he was seeking a better bee,

Frank Benton, Martin, and Rankin in the Bureau of Entomology apiary. Most of the racial imports were tested here.

and again he hoped to "domesticate" Dorsata and even Zonata. The progeny of his effort was to be shipped to government apiaries. He had a sharp eye out this time for exotic honey plants to send to America. Benton visited Constantinople, Caucasus in Russia, crossed the Caspian Sea to Bokhara, by camel to Afghanistan, through Hindu country to the Punjab in India and to Calcutta, then to Singapore, the Phillippines and home.

During these extensive travels of the second trip, many dispatches from Benton, his son, and foreign hosts were received and duly reported in the bee press of America and Europe. One such recorded his imprisonment and risk of life during a civil war in the Caucasus. Another appeared at some length in a French magazine "L'Apiculteur." The latter closed with a description of Benton that is worthy of quotation:

> Benton is 53 years old, medium stature, gray mustache, open countenance, tireless on the march, and indifferent to the heat of the sun. His face shows the effects of his laborious voyages, but they have in no way diminished his activity. He speaks French fluently although he has not practised it for ten years, sometimes thinking for a moment for the proper word. He speaks also several other European languages. Mr. Benton is a man of very agreeable presence, a good talker, and he held us charmed for two days, and excited much interest on our part while relating some of the adventures of his voyage, which would form a very interesting volume. We were much surprised at the profound knowledge of our eminent visitor. Before leaving he selected several choice Italian queens to send to America, and on the 9th of July took a train for Italy.

The dispatches referred to were of optimistic tone—great things were expected of still new races to be sent and brought back by Benton. These dispatches revived great interest in the Carniolans and Caucasians. Strange it was then, that no final and complete report emanated from Benton nor the Dept. of Entomology. Instead a terse announcement was made that Phillips had succeeded Benton as Chief of Apiculture. E. R. Root was far from satisfied by this state of affairs and wrote to the head of the Dept. of Entomology, as to the outcome of Benton's trip. The letter he received was not much more illuminating.

> Dear Sir: I am in receipt of your letter of May 16th asking for information concerning the results of the trip by Mr. Frank Benton in search of new races of bees. I regret that I am unable to give you a report of this trip, since the Bureau of Entomology has received no such report from Mr. Benton, and he is no longer connected with the Bureau of Entomology. The only information which we have on the subject is a verbal statement from Mr. Benton that he found very few bees, and was unable to ship any of them to this country. The tone of his statement concerning them would indicate that they are not desirable. Respectfully yours, etc.

The text of this letter is hard to reconcile with Benton's own letters and the letters of others—to wit, one from a Frenchman published in the spring of 1906:

> Mr. Benton is known to beekeepers throughout the entire world by his writings, his researches, and his work in all kinds of bee culture. In particular is his name connected with the Benton cage for sending queens by mail across continents and oceans. He is especially popular in the United States where for several years he has exercised a great influence in apicultural progress, as much by the great value of his directions and counsels as by the legislative measures which he has brought about and the establishment of model apiaries in the different states of the Union. In his capacity as bee expert of the Department of Agriculture, Washington, he has established a national apiary in that city, where queens are received from principal foreign breeders.

One can only surmise the depth of disillusionment and heartbreak suffered by Benton.

Frank Benton died at Fort Myers, Florida, where he had gone for his health, on Feb. 28, 1919 at the age of 66. His administration in Washington was a stormy one, but no one questions his devotion to, enthusiasm for, nor courage in exploring the unknown of—beekeeping. The popularity of certain races of bees, the queen mailing cage, and several legal precedents are a living monument to his integrity. The beekeeping industry would do well to have more pioneers like Frank Benton.

EARLY IMPORTATIONS OF ITALIAN BEES

by REV. L. L. LANGSTROTH

From March 16, 1881

I can probably give, better than any one living, the history of the first efforts made to introduce Italian bees into this country; as I knew well the late Messrs. Samuel Wagner and Richard Colvin, and Messrs. S. B. Parsons and P. G. Mahan, who, with myself, were the first to import them. Messrs. Wagner and Edward Jessop, both residents of York, Penn., received from Dzierzon, in 1856, a colony of Italian bees which had starved on ship-board. Mr. Wagner's letter to me, August, 1856, and given the next spring, in my 2nd edition on bees, is the earliest notice, published in this country, of the Italian race of bees. Messrs. Wagner and Colvin, subsequently, bought a few queens of Dzierzon, which were consigned to the care of the surgeon of a Bremen steamship, who had been carefully taught what precautions to use for their safety. Fearing that the bees might sting his passengers, the captain would not allow them to be put on his vessel.

"In the winter of 1858-59," (I quote from Mr. Colvin's able article on beekings, in the Report of the Commissioner of Agriculture for 1863, page 530,) "another attempt was made by Mr. Wagner, Rev. L. L. Langstroth, and myself. The order was placed in the hands of the surgeon of the steamer, to whose charge the bees were to have been committed, but in consequence of his determining to leave the ship, the effort failed*. Subsequently arrangements were made, in the latter part of that year, and we received 7 living queens. Only two or three young queens were reared by us during that fall and winter, and in the following spring we found that all our imported stock had perished. In conjunction with Mr. Wagner, I determined to make another trial; the queens, however, did not arrive until June, 1860."

Our queens, which came in 1859, were in charge of a German resident of Brooklyn, N. Y., who was returning home from a visit to his friends, and to whom Mr. Wagner had given very careful instructions how to care for them. This person, learning that Mr. Mahan had expressed the intention of having the honor of landing, in America, the first living Italian bees, and desiring, as he told me, to secure this honor for us, communicated Mr. Mahan's intention to the captain, who, as soon as the gangway was in place, was the first person to step ashore, proclaiming with a very loud voice: "These are the first Italian bees ever landed on the shores of America!"

In the spring of 1856, Mr. S. B. Parsons, of Flushing, L. I., invited me to visit him, and advise with him as to the best way of managing his Italian bees. On my way, I called upon Mr. Mahan, who was joint owner with me of a large interest in my patent hive. He gave me a very graphic account of his visit to the apiary of the Baron Von Berlepsch, from whom he obtained a queen, and supplied me with a few Italian workers for Prof. Joseph Lidy, that he might determine how the length of proboscis, in that variety, compared with that of the black bee. On arriving at Flushing, Mr. Parsons showed me five hollow logs, or "gums," placed in an old bee-shed. It was a warm sunshiny day, and I saw only an occasional bee flying out from one of the hives. These colonies had been purchased in Italy, carried safely on the backs of mules over the Alpine passes, to Genoa, from which port they were safely shipped to New York; but by a succession of mishaps, four of them died at Flushing. The fifth contained a mere handful of bees, with their queen, which I introduced to a colony of black bees. It is hardly necessary to say that none of these hives were ever in the same vessel with Mr. Mahan.

On the 18th of April, the steamer Argo arrived in New York, after a tedious and stormy voyage. Mr. Herman, a German beekeeper, and author of a work on the Italian bee, who had been furnished with a large sum of money by Mr. Parsons to buy Italian bees in the best districts of Italy, and who had agreed to bring them over in the original hives, and breed queens for Mr. Parsons, was not on board, but in his place, a young Austrian, by the name of Bodmer. On the 19th, as soon as the bees were allowed to be landed, they were carried to Flushing. The small boxes in which they were put up were in three different packages, one of which was consigned to the U. S. Government, one to Mr. Mahan, and one to Mr. Parsons. As the Austrian said that he knew, by examination on shipboard, that the bees were in a very bad condition, and many of them already dead, and, as the day was very pleasant, they were all examined under my personal supervision, and I can assure Mr. Robinson that every colony consigned to the Government and Mr. Mahan, was dead. A few, only, of those marked for Mr. Parsons, had living queens, some of which soon died, and in a short time he found himself the possessor of only two queens, one of which was the queen found alive upon my arrival at Flushing.

By my advice, Mr. Wm. W. Cary, of Coleraine, Mass., a very skillful beekeeper, and a thoroughly trustworthy man, was sent for by Mr. Parsons. One of the queens was en-

*Mr. Colvin, having formed the acquaintance of the German Captain, not only convinced him that the bees could not escape to injure any one, but inspired him with a strong desire to be the first to bring over in his own vessel, this valuable race of bees. It would require a volume to tell, at length, what sacrifices of time were made by Messrs. Wagner and Colvin, to secure these bees.

trusted to his care, on the premises of Mr. Parsons, and the other to Mr. Bodmer, some distance off, who did not raise queens enough even to pay for the black bees and honey which were purchased for his use; while Mr. Cary Italianized a large apiary for Mr. Parsons, besides filling all his orders for queens.

One hundred and eleven queens were carried to California, by Mr. A. J. Biglow, 108 of which reached there in good condition. This small per cent of loss was, in part, owing to the skillful supervision of Mr. Biglow, and to the purifying flight which, by my advice, he gave them on the Isthmus of Panama; but all his precautions would have been of no avail but for the judicious way in which they were prepared by Mr. Cary and himself, for so long a voyage. The bees sent to Mr. Parsons were in cigar boxes, into which the combs were merely crowded or wedged: the loosening of the combs on so rough a voyage killed some of the queens, while others were drowned, with their bees, in honey; and others, still, starved from the boxes being over-crowded with bees. It is hardly necessary to contrast Mr. Biglow's success with the heavy losses sustained for years by those who imported bees from Europe. The re-result of Mr. Parsons' dealings with Herman were, that for $1,200 advanced to him, he had only 2 queens to show. The next season Mr. Bodmer, having learned how to pack bees for a sea voyage, brought over a number of queens in good condition, for Mr. E. W. Rose, but was very unfortunate in the management of them. Herman came, some years after, to this country and was employed by a friend of mine in Philadelphia, to purchase for him, in Italy, a large number of queens. The return voyage was long and stormy, and every queen died on board the steamer.

THE FUTURE OF BEE BREEDING

by HARRY H. LAIDLAW, JR.

From American Bee Journal, May, 1942

The desire to breed the honey bee is not new. For many years occasional beekeepers have been so intrigued over the possibility of breeding the bee they have enthusiastically expressed their ideas in the bee journals. Some of these earlier men actually set about to change the bee and not entirely without results. Some of our strains today are a result of their selections. A few pioneers like Wilmon Newell undertook actual genetic studies and pursued them for a time. Apparently one of the most fruitful of these breeding projects has been the breeding station in Europe, where, it is claimed, improvement in stocks has been phenomenal. It is only in comparatively recent times, however, that beekeepers in general have begun to realize there is a vast difference in strains of bees. This realization began to be noticeable some years ago and has gained momentum by the work of Farrar and Schaefer at the U. S. Bee Culture Laboratory at the University of Wisconsin and by the American Bee Journal and state workers in Iowa.

With this realization there came the hope that a bee, considerably better than any we have today, can be produced. That hope seems to be well founded. We have only to look about us to see what breeding has done in other animals and in plants. Our many kinds of horses are without doubt derivations of a common ancestor. The same is true of cows and swine. Our many breeds of chickens, from the tiny bantam to the white rock, are all descended from the wild jungle fowl. The differences in these breeds were brought about through breeding and selection. There are many other illustrations to be found in animals. The instances of plant changes are innumerable and we need only mention the name of Burbank, whom every reader knows produced many new varieties of plants. There is no reason to assume that the honey bee will not respond to selection. There is, of course, the problem of controlled mating but that has been fairly well worked out.

In any program of bee breeding we must recognize the situation which exists in the bee. To mention a few aspects: the drone differs from the queen in having no father, and in having only half as many chromosomes. The chromosomes are the little bodies in the cells which carry the genes and the genes are basic substances which give rise to the characters or traits as we know them. These facts have much significance to the geneticist. The rate of inbreeding can be made more rapid than brother-sister matings, but less rapid than self-fertilization. According to the work of the cytologists, all sperm of a drone are identical and they are also identical with the gamete of the queen which gave rise to the drone. In reality, therefore, the sperm produced by a drone are simply one of the gametes of his mother multiplied millions of times. Since all, or at least many, of the different kinds of gametes she produces will give rise to drones, we have a means, though limited by our ability to recognize them, of actually selecting these gametes for use. It also follows that any variation in the offspring of a queen is due to a variation in her gametes as all the sperm in her spermatheca are identical.

A program of stock betterment may utilize several procedures. The fastest progress will be made if these procedures are based upon a knowledge of the cytology of the bee. In any case, however, the recognition and selection of traits, the crossing, inbreeding, and further selection for the desired combination of traits are essential. This involves the problem of testing, prolonging the life of tested queens, controlled mating, and so on. Though all these problems are difficult, they are not unsurmountable. Some of them have already been met quite satisfactorily.

When all the aspects of bee breeding are considered it is evident that the future of breeding in the honey bee is bright. Our beekeepers are awakening to a need for a better bee, and many of them are indicating their willingness to cooperate in such a program. A number of well-trained scientific workers are already engaged in research along breeding lines and as they receive more support from the beekeeping industry this research will gain momentum. Breeding work, like all other scientific work, requires time because the scientific worker must explore the unknown and will take wrong paths before the right one is found. We progress little by little as we extend our knowledge. It is most encouraging that we beekeepers are at last turning our attention to the quality of our bees, and, if we give our support, we can reasonably expect improvement in our stocks until we have a bee considerably better than any we have now.
Montgomery, Alabama.

BEES AND QUEENS

by WILLIAM G. EATON

Part 3 of Out of the Past for Future's Gain

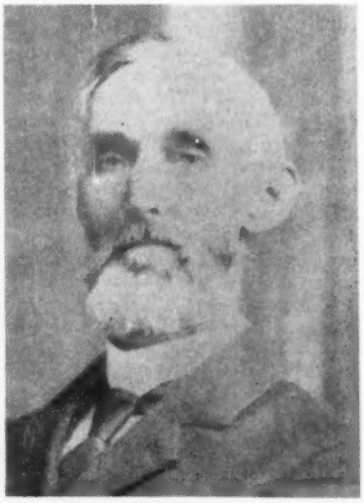
Beekeeping authorities generally agree that bees were not a native of this continent, since all available evidence suggests that they were brought over from Europe at a very early date. Notes on the subject taken from the early 17th century historians, tell us that the Indians regarded the bee as a foreign insect which they called the "white man's fly." They further state that there was no word found expressive of either *wax* or *honey;* this discovery was made when John Eliot translated the Bible into the language of the early Indians.

George W. Demaree, apiarist, lawyer and essayist of Christiansburg, Ky., in a comment concerning the subject in 1884 said: "Looking at it philosophically, however, it is hard to believe that when a beneficient Creator prepared a perfect banquet of nectar bearing flowers, the gentle hum of the honey bee would not be wanting." Demaree's close observation and wide experience through the formative years later gave rise to his swarm control plan, which brought him no little acclaim. His detailed reports of the proceedings of the associations, along with his excellent articles written on a wide variety of beekeeping subjects, are considered of special value today as an accurate account of the early days of beekeeping here in the Bluegrass State. No doubt, the following observations, taken at random from his remaining works and personal effects, will serve our readers well as a source of information as we attempt to get a closer view of the "golden age of beekeeping."

In a discussion on the "The Races of the Honey Bee" he says: "I think there are two varieties of the native, or Black Bee, but to what extent they have commingled together, I am not informed. The prevailing variety, which is common in the Northern and Middle States, may be described as being small in size, slender in body, and in color of a dark steel or iron gray when closely examined. But when in a compact cluster, the general appearance of the colony is dark, bordering on black. The other variety, which is found in Georgia and other southern states, differ from the above variety, chiefly, in that the body is a little thicker in form, while the color is darker, bordering on brown. This variety is not as clean in appearance or so pretty, owing to a greater amount of fuzz or hairs on their bodies. Doubtless, much might be done in the way of improving the native, or Black Bee, by careful and judicious breeding." Realizing some of their shortcomings, he closes by saying: "Give me a bee that will try and try again, that will tumble before the entrance of her hive in her frantic effort to carry in all the honey in the fields in one day, and I will put up with her other conduct."

Attempts were made as early as 1855 to import several new races of bees. Shortly following these early attempts, several enterprising beekeepers began importing bees successfully from Italy, the Holy Land and various other localities, and beekeepers everywhere began raising and shipping bees and queens in an all-out effort to provide themselves with a better race of bees. The Italians were introduced into Kentucky in 1872 by Dr. N. P. Allen, a dentist from Smith's Grove, Ky. Dr. Allen, heading a committee of seven leading Kentucky beekeepers, visited Rev. Langstroth to obtain the initial stock and to gain first-hand information on the race of bees which the German army officer, Dzierzon, had observed during his maneuvers through the Italian hills. The information which they obtained concerning the merits of the hardy "yellows" was: "Like Saul of Tarsus, head and shoulders above all the bees known to the apiarian of the present day."

Dr. Wm. M. Rogers, a bee fancier of Shelbyville, Ky., imported several



Dr. N. P. Allen of Smith's Grove, Ky., was nationally prominent in beekeeping circles for several years, serving as president of two national organizations in 1880. He began organized beekeeping in Kentucky in 1874 and introduced Italians into the Bluegrass State in 1872.

E. E. Barton, of Falmouth, Ky., made history shortly following the Civil War by introducing sweet clover into several northern Kentucky counties. This was one of the first efforts to control soil erosion through crop rotation and a forage plant.

George W. "Squire" Demaree, Christiansburg, Ky., became widely known through his swarm-control plan, which he announced in 1892. In addition, he was a queen-breeder of note, developed the Solar Wax Extractor in its improved form, and served as vice-president of the National Beekeepers' Union in 1893. This organization provided legal defense for beekeepers.

This unusually marked cane was given to Mr. Demaree by one of the Holy Land rulers as a token for a shipment of twelve queens which the Kentuckian had made to his country.

Cyprian queens, and being a great admirer of the new-found race, continued to keep them and no other. Dr. Rogers, working closely with his friend, Demaree, raised several daughter queens from the imported stock, and a report which Demaree made in 1882 to the Commissioner of Agriculture, leads one to assume that beekeepers were already beginning to anticipate the merits of a "controlled hybrid." The report says: "The coming bee will certainly be a cross between the Italian, Cyprian and Syrian bees. The gentleness and industry of the Italian, the robustness of the Cyprian, joined to the prolific, swift-winged Syrian, will give us the 'coming bee,' which will be the pride of the American apiarist."

Complications in management often arose as a result of the "new way," thus swarm control became a major problem during the comb honey era, since the tendency of general equipment adoption was more and more toward the small hive, in order to force the bees to work in the sections of the comb honey supers. It was against this background that Squire Demaree came into the limelight when he announced his newly-devised system of management in a paper which he wrote for presentation at the Ohio Beekeepers' Convention in 1892. The article was titled simply, "How to Prevent Swarming," and was published in the April 21st issue of the AMERICAN BEE JOURNAL. It has often been said that "necessity is the mother of invention," thus the *new condition* known as "Demareeing" soon became a widely-used system of management among the beekeepers of the country for a generation, and actually it created a period of transition between the use of the small comb honey hive and a system which employed the use of a double brood chamber hive.

In announcing his solution to the swarm control problem, Demaree said: "Those people who are determined to stick to the paths of the past, are not in position to profit by any new discovery; and this essay is not written for that class of people. If you have the ingenuity to apply proper management to suit the *new condition*, your surplus yield will be larger than by any other method heretofore made known to the public." I will not mention the mechanics of the plan, since it is discussed in most of our literature today, except to say that the principle involved was based on the separation of the queen and brood within the hive.

In 1879, J. P. Moore of Falmouth, Ky., began queen rearing activities which brought him considerable recognition around the turn of the century. Mr. Moore was recognized for having developed a strain of leather-colored Italians, which had a very long tongue reach. Immediately following the Civil War, E. E. Barton, also of Falmouth, made history by introducing an "obnoxious weed" into the area, in one of the first efforts at crop rotation. The "weed" was sweet clover, which later provided farmers throughout several northern Kentucky counties with a land literally "flowing with milk and honey," since the dairymen and beekeepers of the area had acquired a new lease on life, through the benefits derived from their greatly improved soils.

During the early 1880's, J. S. Reese of Winchester, Ky., developed the industry's first bee escape, through his application of the principle involved in the simple, old-fashioned fly trap. This practical, though somewhat cumbersome device, was sold to an unidentified man for $25.00, after some additional refinements by Reese. The Reeses, father and son, Wallace, obtained high colony averages (200 lbs.) during these years, by using migratory practices. They operated as many as 425 colonies for several years until foulbrood hit the area, wiping out the life's earnings of several beekeepers within the area overnight.

This concludes my series of short historical accounts of several subjects which has been my privilege to follow rather closely during the last few years. It is my sincere desire that these accounts have served as a source of information and inspiration for each reader. May the fires which were kindled in the creative and productive minds of the early greats never be snuffed out, and lastly; may the past truly serve us as a guidepost, rather than a hitching post.

Credit is due several agencies and individuals for assistance in compiling the preceding material. They are as follows:

Kentucky Department of Agriculture, Frankfort, Kentucky.

Library, State Historical Society, Frankfort, Kentucky.

Dr. Lee H. Townsend, Head, Department of Entomology and Botany, Agricultural Experiment Station, University of Kentucky, Lexington, Kentucky.

Robert W. Vance, Vance Honey Farms, Highway 421, Pleasureville, Kentucky.

Morris Black, Hillside Honey Farms, Defoe, Kentucky.

"The History of American Beekeeping" by Frank C. Pellett, Collegiate Press, Inc., Ames Iowa, 1938.

Early Beekeeping literature and publications, personal effects and correspondence.

Friends and relatives of the early, famous Kentucky beekeepers.

The Commercial Operator

FLASHBACK . . .

Busy-ing The Bees on the Farm

This is about pollination—commercial pollination. The first pollination work I ever did was to put bees in greenhouses for cucumbers, years ago. There were several thousand colonies of bees used for greenhouse pollination in the Boston area at that time.

Then came bees in the orchard. Five hundred colonies in a 2,000 acre block of several varieties of apples at Hillview, Illinois. Quite a job. Bees were all package bees in new equipment, placed in groups around the orchard. Many of the blocks that had not set fruit before made enough fruit that year to pay for the venture. Thereafter the orchardist hired a beekeeper for the job.

The next pollination venture was for red clover. The pay was to be half the seed above the 10-year average. It failed. Some farmers out of range of these bees gathered as much seed as we did. Even though we got more than the 10-year average we did not feel justified in asking the farmer for a share of the seed as it could not be demonstrated that the bees had provided the extra income.

The next was also red clover on a different basis. The bees surrounded the field. Feeding stations made of lengthwise pans provided by dividing 60-pound cans in two were placed at intervals through the field by determining the visit of bees to the feeding station and allowing some overlap for flights through the entire field. A thin syrup was used and clover blossoms were thrown into the feeders not only to "mimic" the blossom odors in attraction but also to prevent the bees from drowning. This worked. The amount of seed was about three times more than we were able to get with any other method.

The drawback to this, of course, is acreage. This would be a task for large acreage. It might be that a spray with a synthetic flower odor could be used over the entire field. We never tried it. Also there is the matter of attraction of plants in bloom of interest to bees during the same time as the bloom of the legume.

In his book, "Bees are My Business," Harry Whitcombe found that by changing the bees in the acreage so the bees being used that had shown decreasing interest in the blossoms of alfalfa at the time were taken away from the fields and replaced with bees with a fresh interest in the flowers. This flower attraction, therefore, seems to be a part of the pollination picture. Anyway in Whitcombe's case the increase in alfalfa seed was phenomenal.

This is not quite a flashback although it does go back a longways to those cucumber days,—something like fifty years.
GHC

The Engelhardt's Produce Honey The Year Round

by Boyd W. Moffett*

With approximately 1800 colonies, Paul H. Engelhardt of Antwerp, New York, has one of the largest—and most unusual—apiaries in the eastern part of the United States.

It is unusual because of the fact Mr. Englehardt's bees do not work in Jefferson County alone. They extract nectar from blossoms in Florida, South Carolina and Connecticut as well. Thus these bees labor in four states, and it is almost a year-round operation, with a brief lull only from late fall until early winter.

"Golden Queen Apiaries," the name of the Englehardt business, also has another distinction. It boasts one of the "Empire State Honey Queens" in the person of Mr. and Mrs. Engelhardt's daughter, Miss Gloria Ann Engelhardt, 23-year-old brunette. In addition, the couple's son, Alfred, 18, a June graduate of the Antwerp High School branch of Indian River Central School, is about to enter the business with his father.

The apiary is located on Waite Road, just off Route 26, one and one-half miles north of Antwerp. In adjacent fields are scattered many of the beehives, while the rest of the 1800 are spotted throughout this region—as far north as Heuvelton, southwest to a point near Calcium and south and east in the vicinity of Carthage and a point where Jefferson, Lewis and St. Lawrence counties meet.

For a number of years Mr. Engelhardt had hives at varied locations on the Camp Drum military reservation. More recent regulations prevent this, but he still has a sizable number on the fringes of Pine Plains, where nectar seems to be plentiful.

As soon as the last flow of honey is extracted, probably some time in October depending entirely upon weather conditions, the family will take a brief rest. They will remain at their home near Antwerp for the holidays, but shortly after Jan. 1 will prepare to start south.

Approximately 800 hives of bees will be transported by truck to a location in central Florida. About 600-700 hives will be left to "winter-over" at the home farm. The rest of the colonies, composed mostly of older or weaker bees, will be "disposed of" at the farm. The Engelhardts have one truck capable of carrying 308 hives and the bees seem to stand the jaunt southward in exceptionally good manner.

In Florida, hives will be set up in the blossom-rich citrus orchards. The Florida nectar flow usually is available by the end of January and continues through February and into early March.

Then the Engelhardts start north

*Staff writer for the Watertown (New York) Daily Times.

again, stopping off in South Carolina where the bees are put to work to gather another crop of honey, as blossoms bloom with the advent of spring and the movement of warmer weather northward. This continues during April and early May.

Next stop on the return trip north is in the apple orchards of Connecticut. There the bees go to work on the apple blossoms and harvest a bountiful crop of honey within a period of a week or ten days.

By June 1, the Engelhardts are back at the Antwerp farm, ready for a summer season in the North. And during June and July the honeyflow is usually good enough to merit visiting the hives twice a week.

The concrete block honey house at Antwerp is more than "a beehive of activity." The average beekeeper has one extractor, Mr. Engelhardt has three. And, in addition to his son's help, he employs three or four men most of the summer season.

Each of the extractors is capable of holding 50 combs of honey. After being placed in this cylindrical vat, and the cover closed, a high-speed motor sends the racks spinning in a swirling motion. This extracts the honey, and it flows through tubes into a 13,000-pound capacity tank in the basement. This tank acts as a sort of settling reservoir, with the rich, pure honey drawn off through a faucet at the bottom.

Honey goes on the market in one-pound and five-pound glass jars, in wooden comb boxes and in five-gallon size metal cans. Most of the honey packed in jars and boxes is disposed of through regional wholesale and retail outlets. The Engelhardts have bottled as much as 50,000 pounds of honey a year for disposal in glass jars. The bulk cans go to handlers in Syracuse, Fredonia, New York City, Connecticut and Canada, and foreign shipments are made to Holland, Belgium, Germany and other European countries.

In addition to the actual honey, beeswax, a principal by-product, is a valuable item. One pile of large cakes of beeswax in the honey house totaled nearly 1800 pounds.

Mr. Engelhardt obtained his first bees in 1935, he relates, and started his Antwerp apiary in 1941. During the early years he was in business the bees were taken to Florida each winter. From 1948 through 1956, however, winter quarters were set up only in South Carolina. But in 1957 he planned to return to Florida again.

Part of Paul Engelhardt's wax crop from his 1800 colonies at Antwerp, N. Y.

Daughter Gloria Ann loads one of three extractors. In the basement are 80,000 pounds of honey stored in sixties, ready for shipment to both foreign and domestic markets.

The Sideline Producer

FLASHBACK

Garden of the Gods

Since the Flashback for Commercial is about pollination, let's make this one also about pollination.

This goes back to childhood days when an apiary of about thirty colonies was maintained year after year in the backyard of our home. Its purpose was two-fold, honey and pollination. We were perfectly aware that these two purposes were equally important.

We had no ambition for any larger commercial venture than that represented by this one bee yard at home. Neither did we have any wish to extend operations to produce more honey than we could conveniently produce without any extra work or special management methods. We had no use for an extractor or honey house. All the honey produced was comb honey and we didn't do so bad at that. It is true that comb honey is an expert's job but we considered ourselves experts.

In the field of pollination, however, is where our bees did their job and what a field they had to work in, all fruits—apples, berries, plums, cherries. I remember one Northern Spy apple tree right by the back door that always bore a terrific amount of the most wonderful aromatic apples you ever saw or tasted. Nobody else in town had Northern Spys like that and there were quite a few trees of this variety. They can scarcely be found any more.

As for the berries; well, they produced a size and flavor that at least to us seemed superior than any other fruit of any similar varieties in town.

As a matter of fact, the bees worked assiduously on all the fruit and berries, plums and cherries, all day when they were in bloom. They were eager beavers. I suppose the neighbors got some benefit too. There was never any complaint. Summer and winter the bees were there and we always had an abundance of the finest fruit and berries imaginable.

Perhaps this is at the base of the original association between the flowers and the bees. It's only when we got into size that balances were upset.

It must be remembered too that this picture of early days took place in town, in fact almost in the center of town; not exactly on Main Street but then it wasn't on the edge of town. You hear people howl these days if bees are kept within flying distance but not back in those days. Everybody understood that bees were a part of the Garden of the Gods.

GHC

INCREASING WITH QUEEN REARING

by RAY BENTLEY

Follow the text to understand this diagram.

The indispensable conditions for the rearing of *good* queens are:

(a) Colonies must be strong, especially in bees between the ages of 6 to 13 days, for this is the age they are most apt in the manufacture of royal jelly.

(b) Before and during the raising of queen cells, the colonies should have an excess of warmth (induced by a crowded condition).

(c) There must be plenty of honey (over 15 lbs.), pollen and water.

Below is my schedule adapted to a locality where the dandelion and yellow rocket flow starts about May 15th. The plan calls for making one increase from two colonies. It is used primarily for making up winter losses.

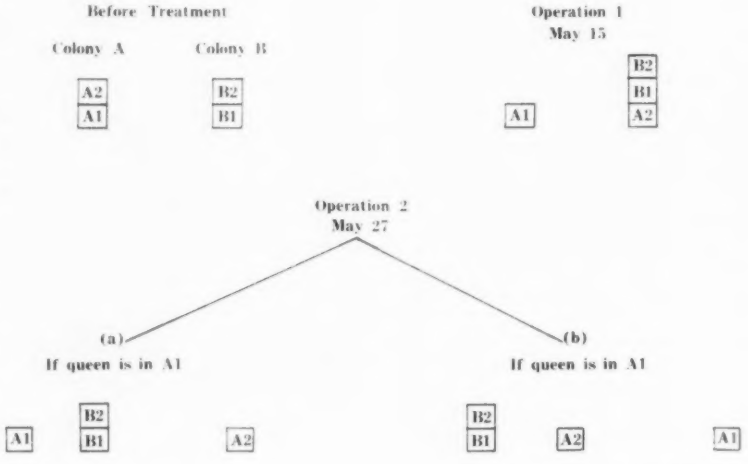
Operation 1

Split strong two story colony A into two equal parts as to brood, pollen, and honey. Don't bother to look for the queen. Call the bodies A1 and A2. Arrange the brood in the center of the two bodies. Leave A1 on its original stand with its own bottom board and covers.

Now move another strong colony B from its stand, place A2 furnished with a regular bottom board on the stand of colony B. Give it a bee-tight inner cover. Place two ¾ inch wide pieces of cedar shingle with butt edges to the front along the top side edges of the inner cover. Remove bottom board from colony B and set colony carefullly on top of the shingle strips and inner cover of A2. We have thus provided colony B with an inconspicuous entrance from which the field bees will fly but will return to colony A2 below without confusion.

Operation 2

12 days after operation 1, move queenless colony A1 or A2 to a stand some distance away and put colony B with a regular bottom board in its place.



Let us review the results of the above. After the best colony is divided, A1 gets all the field bees of the two story colony so that the ratio of bees to brood is increased in this half.

The other half, A2 gets the field bees which fly from colony B and return to their old entrance location which A2 now occupies. Again in A2, the ratio of bees to brood is increased.

A quick check 12 days later reveals the queenless half of A by the absence of open brood and the presence of queen cells. This colony with its cells is placed on its own stand some distance away and Colony B placed in its stead. The colony with the cells loses its field bees and hence does not swarm as it normally would soon after the hatched virgins are able to fly (2 days of age). Two weeks later this colony should be checked for a laying queen and if there are no eggs present give a comb of young brood to encourage the queen to start laying, and if in two days queen cells are started, the project may be considered a failure and the two parts of colony A again united by the newspaper method.

It must be emphasized that there should be a honeyflow on at the time of operation 1 and that the colonies must be strong (at least 7 frames of brood). Different localities usually require different time schedules.

Making increase in this manner will often prevent all colonies involved from passing their peak of strength before the main honeyflow begins.

If queen cells are present at the time of operation 1, they must all be destroyed.

New York

Returning Swarms

Several years ago I got a phone call from a beekeeper, who said, "There is a swarm in a tree. Will you come and get it down for me?" So I quickly drove out to his place. There he showed me a large swarm, clustered under the trunk of a tree, that had fallen into the top of another tree. It was impossible to shake the bees off. So we got a ladder, and a sack, and tried to brush the bees into the sack.

We got most of the bees in but there were some that continued to fly back and cluster under this tree. A hive was prepared, and the bees were dumped out of the sack into it. However, the bees wouldn't stay in the hive and began to fly around.

The air was soon filled with bees, and I expected them to start off for other regions. Then I noticed the parent hive covered with bees and more bees were settling on it, and crawling into the hive. A small cluster remained on the tree, but it looked as if we had gotten most of the bees to return to their old hive. This beekeeper later claimed he got a nice crop of honey from this colony.

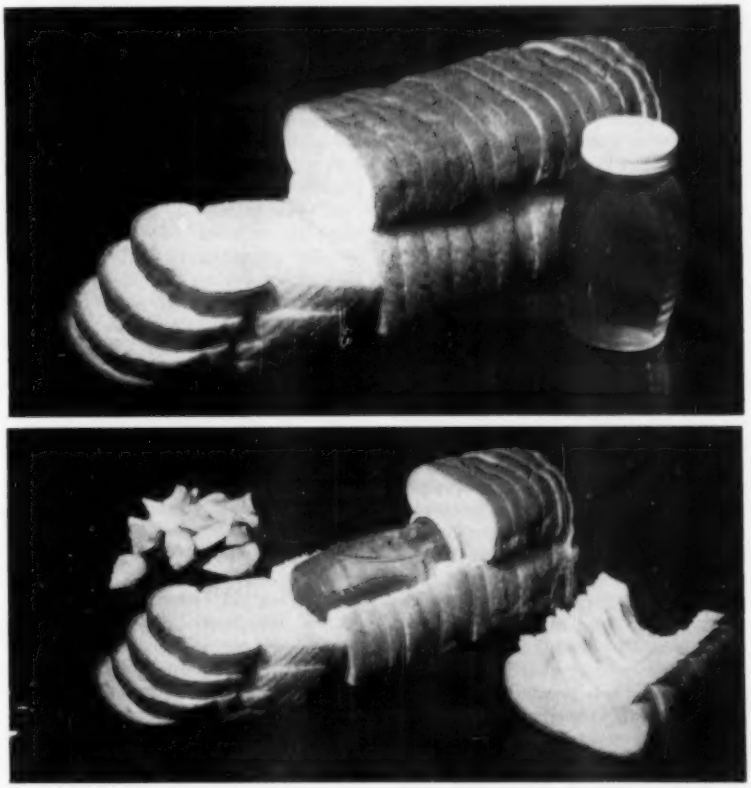
I have noticed this phenomenon several times. If a swarm is in an inaccessible place, and then disturbed, only some of the bees try to cluster back there. The others will fly around for a while, and then return to their original hive. The resulting crop of honey seems to be greater than what would be gained from the parent colony or from the swarms in separate hives.

W. F. Perschbacher

Alberta

Pollination Need, Makes Beekeeping Important in Franklin County Tennessee

William Eaton, picture editor for our Southeast Edition (October and November) and frequent ABJ writer, sends a clipping from the Winchester Herald-Times, Nov. 18, about Franklin County, Tenn., which emphasizes the importance of beekeeping in the county for the pollination of farm crops. The item was written by Bernard Sisk, secretary of the Franklin County Beekeepers' Association. He urges farmers and gardeners to contact County Agent, T. L. Mayes concerning the types of sprays and the right time to use them to spare the bee population, since improper spraying can easily destroy many of the insects that do the pollinating work.



Bread for Mailing Honey

If you wish to send anything that may easily be broken in the mails, such as a jar of honey or a bottle of mead, cut a loaf of bread in half and scoop out the middles. Place the jar or bottle in the opening in the space so provided and pack around the jar with bread. Then replace the other half of the loaf. Wrap and mail and the bottle or jar will be thoroughly cushioned by the bread to prevent breakage.

Ernest Goward

Mansfield, England

Photo by Robert Smulling

Industry

— EDITOR —
ROBERT BANKER
Cannon Falls, Minnesota

Caution In The Use of Chemicals, Drugs, and Antibiotics

C. L. Farrar

Entomology Research Division, Agricultural Research Service, U.S.D.A.[1]

The beekeeper must recognize that Federal food-additive laws now in effect apply to honey as well as all other foods. The large purchasers of honey are requesting suppliers to certify that the honey offered for sale is pure and free of contaminants. Honey, like any food product offered for sale, can be condemned if it contains even traces amounting to less than 1 part per million of a chemical, drug, or antibiotic for which no legal tolerance has been established. One publicized condemned shipment could do great harm to the entire honey market. This situation need not cause a panic in the beekeeping industry, but *it does require caution and good judgment in how chemicals and medicants are used.*

Many beekeepers think the food-contamination problem centers on the use of sulfa compounds and antibiotics for the control of bee diseases. These are important, but when used with discretion they probably present less of a problem than carbolic acid used for the removal of honey, calcium cyanide used for killing colonies before extracting the honey, and the fumigation of comb honey.

Most of the materials in question are needed for profitable beekeeping management. Experience has shown that they can be used safely for the purpose intended provided they are employed at the right time, by the right method, and at the correct dosage. However, meeting the legal requirements with respect to residues is a matter of special importance. Precautionary recommendations are presented here as a guide in the use of the principal chemicals and medicants employed in beekeeping practices. The recommendations will be subject to change as more specific information on each becomes available.

Sulfathiazole, streptomycin, dihydrostreptomycin, terramycin, fumagillin, and similar materials *should be used primarily as disease preventives.* These medicants also have value in eliminating active infections. The distinction between disease prevention and disease control is in the degree of colony infection. For disease prevention, they are directed against the infections that are not detected by inspection and before the pathogens have a chance to increase. However, *preventive treatment should not be substituted for careful and frequent inspection* of all colonies for disease. Any medication that does not prevent disease from developing in good colonies during a 2- to 4-week spring treatment should be considered ineffective and its use discontinued.

Medicants should be used only on vigorous colonies. Inferior colonies —colonies without vigorous brood production due to the queen, populations, or lack of pollen—will not clean up all the infected brood that may be present. Treatment of weak colonies usually results in a temporary check on the disease.

The medicants should be used early in the spring *at least one month ahead of the surplus honeyflow.* The reason for early-spring preventive treatment is to avoid loss of brood or bees from disease and provide ample opportunity for the colony to consume all medicated stores well in advance of the honeyflow. Preventive treatment should be used in apiaries having a previous record of disease or in those located where disease has been present in other apiaries within flight range.

There are three general methods of applying medicants: (1) gorging the bees by pouring medicated sirup over the clusters; (2) mixing the medicant with powdered sugar and dusting it over the clusters; and (3) bulk-feeding the medicated sirup by use of feeder pails, division-board feeders, or filling combs with sirup. All the medicants can be included in pollen supplement. The choice of method can affect the success of treatment. It is necessary to know the disease you are applying treatment against and the characteristics of the medicant that influence its effectiveness.

The gorging method provides good dosage control and the medicated sirup will be distributed in and around the entire brood nest, where it will be used immediately by the colony. The medicants should be added to heavy sugar sirup (2:1) because it prolongs their availability. Two additional treatments at 4- to 5-day intervals are necessary to enable the bees to clean up any infected larvae that may be present while protecting against further spread of disease. The procedure is to pour about 1 pint of the medicated sirup over each cluster, leaving the cover off as each colony is treated; then return to the first colony and add a similar quantity of sirup, replacing the cover. Continue with successive colonies until all have received as much sirup as the bees will clean up. The amount to pour at one time will depend on the number of bees in the colonies, but use the maximum that will not cause an excess to run out the hive entrance.

The dusting method does not permit good control of the amount of medicant each bee receives. It has been commonly used but provides uncertain distribution of the medicants through the brood nest and some are toxic above certain dosage levels. Thus, the dusting method introduces many elements of chance in dealing with disease problems. Beekeepers can ill afford to take chances with methods that require prolonged treatment to eliminate disease. To do so increases the chance of contaminating the surplus honey, increases cost of labor and materials, and reduces the strength of colonies.

Bulk feeding does not provide the best distribution of medicated sirup in the brood nests of strong 2- and 3-story colonies, but it is satisfactory for disease prevention in package colonies or for fall feeding after the colonies or for fall feeding.

The incorporation of medicants in the sirup used for mixing pollen-supplement cakes is recommended for disease prevention where the colonies are sufficiently strong to consume 1 to 3 pounds of supplement per week.

All *medical agents should be accurately weighed to provide exact dosage control.* Dosages are given in milligrams or grams because the amount required per colony or volume of sirup is too small to weigh in ounces. A balance scale weighing in

[1]In cooperation with the Wisconsin Agricultural Experiment Station.

grams is a necessity for proper use of medicants in apiary management, unless sufficiently large quantities are used at one time to employ scales weighing in ounces. One milligram equals 1/1000 gram, one gram equals 1/28.4 ounce, and 1 ounce equals 28.4 grams. If necessary, have your druggist weigh the amount you need. Use of a crude measure, such as a spoonful, may fail to control the disease or the treatment may prove toxic to the bees.

American Foulbrood

In most states official apiary inspectors are required to burn all colonies infected with American foulbrood. The state laws are designed for the protection of the beekeeping industry. Beekeepers employing therapeutic medicants should encourage full enforcement of their state inspection and disease-control laws. The presence of disease in any apiary is a menace to other beekeepers and an indication that the owner is not using proper control measures.

Inspect colonies frequently and comply with your state laws pertaining to this disease. Preventive treatment is desirable early in the spring for all colonies in apiaries having a record of American foulbrood or in areas where this disease has been known to exist. Use 1 gram of sodium sulfathiazole per gallon of 2:1 sugar sirup (1 oz. sulfa/30 gals. sirup) applying three gorging treatments at 4- to 5-day intervals; also incorporate the same medicated sirup in preparing any pollen supplement.

Three dusting treatments with 160 milligrams of terramycin in powdered sugar during a 2 weeks' period have also been reported effective. The Terracon preparations TM-25, TM-10, and TM-5 provide 25, 10, and 5 grams of terramycin, respectively, per pound of Terracon. To provide 160 milligrams of terramycin, mix 1 part of TM-25 with 4 parts of sugar and apply ½ ounce of the mixture per colony at each treatment (for TM-10 use 1 part to 2 and apply ¾ ounce or for TM-5 use equal parts and apply 1 ounce). Soluble terramycin (TA-FSP-25) has been recommended at 54 milligrams per treatment.

European Foulbrood

European foulbrood has become a serious disease in the last 10 years. There is evidence that it was far more prevalent during the two preceding decades than beekeepers realized. For many years it attracted little attention because diseased larvae were seldom seen. We now know that considerable brood was lost, but it was cleaned out by the bees before the symptoms of European foulbrood could be recognized. Colonies with low-quality brood that is not due to poor queens, pollen deficiency, or similar factors respond to medicants that are effective against the virulent form of European foulbrood.

Streptomycin sulfate or dihydrostreptomycin sulfate at a concentration of 0.6 gram (600 mg.) per gallon of 2:1 sirup (2 oz./100 gals.) in three applications during a period of 2 weeks by the gorging method has proved most effective in the prevention or control of European foulbrood.

Terramycin has also proved effective but is somewhat slower in action than streptomycin. This may be due to its use as a dust or to the great variation in dosages that have been recommended. Terramycin is relatively unstable in solution and has generally been applied as a dust.

Nosema Disease

This disease of adult bees probably takes a greater toll of the productive capacity of honey bees than do the brood diseases. Nosema is so widespread we must presume that every colony has some infected bees. The infection level may range from less than 1 to 100 percent. Nosema shortens the life of bees by about one-half. The most important means of control is good colony management, which provides conditions that are favorable for brood rearing to add young bees to the colony faster than the infection spreads within the population. Losses from Nosema are most conspicuous in colonies started with package bees, in nuclei, and other weak colonies.

The antibiotic fumagillin is effective in preventing Nosema from spreading within a population and in reducing queen supersedures due to the infection of the queen: One gallon of 2:1 sirup containing approximately 5 grams of Fumidil B (100 mg. fumagillin) should be fed to package colonies when they are installed in the hive. The product Fumidil B is packaged specifically for bee feeding with directions for its use, and each gram contains 20 milligrams of fumagillin. Nuclei should be fed the same concentration of fumagillin in all sirup they require.

Carbolic Acid Boards

The common practice of using carbolic acid in removing bees from supers probably presents a greater food-contamination hazard than do the medicants. A safer method is urgently needed. If you use carbolic acid, exercise the following precautions: (1) Use this method *only for removing sealed honey and under conditions* that will permit the bees to be driven off the combs in 2 to 3 minutes; (2) make sure the cloth is well separated from the super by use of a deep rim; (3) use chemically pure carbolic acid; (4) use it sparingly; (5) stand the supers on end when they are set off the hive to obtain maximum ventilation before loading, but use due precaution under conditions that would cause robbing; and (6) stack the supers for good ventilation in a hot room equipped with an adequate exhaust fan and delay extracting until all odor of carbolic acid has been removed.

Calcium Cyanide for Killing Colonies

Do not apply calcium cyanide or any other poison with a dust gun to colonies from which honey is to be removed for extraction. If you do use cyanide, place it on papers on the bottom board and on top of the hive under the cover, and when removing these papers containing the cyanide residue be careful not to spill any on the combs. It would be safer to remove all supers to be extracted before killing the colonies.

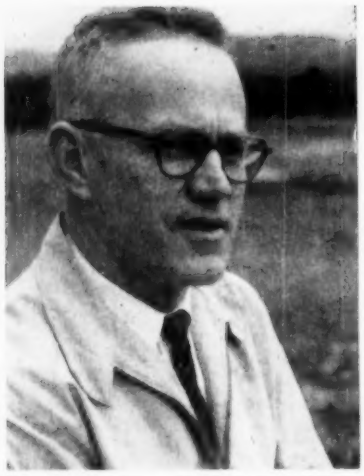
Fumigation of Comb Honey

Place the fumigants in shallow receptacles on top of the supers for evaporation, since the gases are generally heavier than air. *Do not pour or discharge a fumigant directly onto the honey.* Follow all precautions specified for handling a particular fumigant and ventilate the super thoroughly after fumigation.

Extracting Honey from Brood Chambers

The practice of extracting honey from brood chambers, which is used in some areas, will increase the chance of contaminating honey with medicants that have been fed. Under such conditions special caution in use of medicants should be exercised. Well-managed strong colonies with large honey reserves will consume several times as much honey, but they will produce a surplus two to five times greater than small colonies kept on bare subsistence rations. More often, use of brood nests larger than are employed under some systems of management will increase the size of the surplus crop. Thus, it may be false economy to extract honey from the brood chambers to reduce the weight for moving.

The beekeeping industry must accept the responsibility of managing so that honey contamination will not occur. This will necessitate the utmost caution in how, when, and at what concentrations beekeepers use chemicals, drugs, and antibiotics.



Editor - W. W. Clarke, Jr.
204 Agricultural Education Building
Pennsylvania State University
University Park, Penn.

The Beginner and Novice

Question from
Dallas D. Low
Hawaii

► I ran across the question from Jim Esmoil in the latest (April) Bee Journal about honey production in Hawaii and I thought it might be of interest to many readers as well as Jim to send this note informing you that beekeeping in Hawaii is becoming a flourishing business.

There are several large honey producers on all of the Islands. They each have stands of bees numbering into the thousands. There are also several smaller producers who belong to the Hawaii Beekeepers Association who are producing many different honeys in regards to colors and flavors; all, we assure you, of top quality.

We are also producing queens, comb honey and the food supplements, all of which are to be exhibited this year for the first time in the Hawaii State Fair which will begin on June 26 and will run for ten days. Come on over. Mr. Richard Bovard, president of our bee association, is in charge of the Fair arrangements.

I might also add that we believe we have disease-free bees and at present I know of no disease on the Islands. Our bees produce the year around with our heavier flow beginning now. We never have to wrap our swarms up for the winter as some of you do. They are always wrapped up in sweet smelling flowers and sunshine. Come over and see us sometime.

Answer

Thank you very much for your letter on beekeeping in Hawaii. I am assuming that I have your permission to publish this letter in our column, since many beekeepers will be interested in beekeeping in our newest and apparently most beautiful State. I am sure many of us would enjoy going over to the Hawaii State Fair; all we need is the excuse and the money.

Thanks again; I appreciated and enjoyed hearing from you.

● *Question from—*
Louis Behnken, Jr.
Percy, Illinois

I lost some colonies due to starvation and now I have trouble with the brood combs becoming covered with a white mold. What can be done to keep them free of mold? Will it be all right to start packages in them? Would it be best to use some foundation with the combs? Can the mold be cleaned from the combs?

Answer:

I cannot understand why your combs would mold. We often find a white substance on beeswax which we call bloom. It does no harm and is usually found on beeswax which has been exposed to the cold. If you have mold in the comb, it is probably the stored pollen which has molded. Storing the combs in a dry place will probably prevent this trouble. I doubt that you, yourself, can clean any mold from the combs, but the bees will do the job very well.

I see no reason why you cannot put package bees on these combs as long as the combs are free of disease and composed of worker cells. The bees will do a good job of cleaning them. I would, of course, replace damaged combs.

● *Question from—*
Leland Molgaard
Sioux Falls, So. Dak.

I am a beginner with two new colonies and two old ones I bought this summer. The new colonies are fine but the old ones don't have enough to last the summer. They didn't produce. I can buy some more used hives along with an extractor and so on.

Can old hives (that may contain disease) be cleaned and painted so as to be safe to use again? I would naturally buy new foundation for them. If they are usable they would be an inexpensive addition for me. How should I clean them? Would washing with lye water, sanding inside and out, plus a paint job on the outside clean them up? Some of this equipment has not been used for a while.

Answer:

Yes, diseased equipment can be cleaned and disinfected to make it safe to use.

I, personally, do not think washing with lye water is the best method. I would prefer to scrape the equipment clean and then boil it in lye water. It should be boiled until the wax and propolis are off the equipment. The stronger the lye solution, the shorter the time the equipment must be boiled. After boiling, wash with clean water and allow to dry. Sanding is not necessary but it makes a neater job, and the hives should be painted. The extractor can be cleaned by washing with soap and water.

The fact the equipment has not been used in a long time makes no difference. The spores of American foulbrood apparently live almost forever.

If the equipment is cheap and, if you are willing to take the time to do a thorough job of cleaning and disinfecting, you can certainly gain by buying such equipment. You may have to renail some of this equipment after it has gone through the boiling lye water.

● *Question from—*
Wayne Babcock
North Loup, Nebraska

I have a few modified Dadant hives. I have cut the frames to standard 9⅛ depth. Will the space beneath the frame matter; or will I have to cut the hive down too?

Answer:

If I were cutting down the frames of a jumbo hive, I would certainly cut down the hive body. The bees are very likely to fill the space below the frames with comb, especially during a heavy honeyflow.

I suppose you have noticed that, even in a hive with the proper space below the frames, the bees will build mounds of wax on the bottom board. These mounds are commonly called ladders.

The Federation

Secretary Joseph O. Moffett
115 So. College Ave., Fort Collins, Colorado

The widespread activities of the Federation are again evident in the events of the past two months. Some of these are mentioned below.

President Budge Flies to Washington. The Federation president, Lawrence Budge, of Malad, Idaho, flew to Washington on important business. We hope to have a report on his trip in the next Federation newsletter.

Hansen, Moosman, and Others Plan 1961 Convention. Vice-president Henry Hansen and Charlie Moosman have spearheaded the planning for the 1961 convention at Omaha. An excellent tentative program has already been drawn. This should be the best convention the Federation has ever held. The dates are January 30 through February 3.

Life Insurance Program Being Put into Effect. The many details and the work concerning the group life insurance plan have been taken care of. The response to this plan has been very favorable. Anyone desiring this insurance should write the secretary for details on how to apply.

Queen Committee Active. The queen committee, headed by Mrs. Carl Soder of Stratford, Iowa, has formulated the rules for the 1962 queen contest. The queen has been busy obtaining publicity for the honey idustry.

Floyd Working on Honey Booth. C. D. Floyd of Minnesota is arranging the honey booth at the American Home Economist Association convention in Denver. This booth has proved a very excellent method of promoting honey.

Becker and Seidelman Arranging Honey Show. In Michigan, Walter Becker and Mrs. George Seidelman are working out the rules and details for the National Honey Show which will be held in early September at Detroit.

State Secretaries. In many states, state secretaries are collecting Federation dues and forwarding them to Fort Collins. Some of these are Harold Rice of Colorado; Mrs. O. R. Burdett of Montana; Walter Fliegner of Wyoming; F. Q. Bunch of Minnesota; O. H. Roth of Michigan; Oliver Petty of Oregon; Mrs. Mary Benson of Arizona; and Gladys Granson of Iowa.

Join the Growing Federation. Join with your fellow beekeepers in the Federation today to help advance our industry. *Membership is up 30% over last year.* Help us keep advancing. Minimum dues are $3.00, with a suggested rate of 4c a colony for beekeepers having over 75 colonies.

Meetings and Events

Middlesex (Conn.) Association
Haddam, June 5

The summer meeting of the Middlesex, Connecticut Association will be on Sunday, June 5th, at 2:30 p.m. at the Agricultural Center in Haddam. A potluck supper will be shared. Although started as a county organization this association is rapidly expanding to include beekeepers from neighboring counties so anyone interested in beekeeping is welcome. For further information contact C. A. Rowland, Secretary, Round Hill Road, Middletown, Conn.

Northeastern Kansas
Kansas City, Kansas, May 1st

The May meeting of the Northeastern Kansas Association will be at 2:30 p.m., Sunday, May 1st, in the Wyandotte County Court House, 7th and Ann Streets, Kansas City, Kansas. Election of officers will be followed by a dramatization of the "Story of the Honey Bee" and a talk about the "Importance of Labels and Their Wording." Everyone interested in bees is cordially invited to attend. This is now the largest association in this area.

R. F. Ferguson,
Secretary.

New Hampshire State
Candia, May 7th

The N.H. State Association will hold its first meeting of the year, in Rockingham County, at the home of Dr. Sander, Candia, on Route 101A, N.H., May 7, at 2 P.M.

A special drive for membership of beginners is being planned. A package of bees will be installed at this meeting, and will be given to a beginner member at end of season, who holds the lucky number on his or her membership card.

Pollinating will be discussed by competent working beekeepers.

Everyone and his neighbor are more than welcome to attend.

Barbara Prior,
Secretary.

Pennsylvania Short Course
Pennsylvania State University
August 15 - 19

The 15th annual Beekeeping Short Course of The Pennsylvania State University is scheduled for August 15 to 19, announced Professor E. J. Anderson, Beekeeping Specialist. Over 500 persons from 13 states and seven foreign countries have attended in the past.

Students will also be able to attend the meetings of the Pennsylvania Beekeepers Association on August 20.

Included in the instruction will be such topics as spring management and swarm control for comb and extracted honey production, methods of wintering bees, introduction of package bees, control of diseases and enemies of the honey bee, extracting and bottling of honey, queen rearing, requeening, fall management, marketing of honey, and care of bees for pollination of fruit and other crops.

One half of each day is devoted to lectures on the theory of beekeeping and the other half to practical application of bee management. Students will be given the opportunity to develop skills in the 5 University bee yards and in the laboratories. Students are required to bring their own protective equipment.

Any individual, 16 years of age or older, is eligible to attend. Younger individuals will be accepted if accompanied by a responsible person.

The cost of the course is $7.25 for Pennsylvanians and $12.25 for non-Pennsylvanians. More information and application blanks may be secured from the Director of Short Courses, Room 211 Armsby Building, College of Agriculture, Pennsylvania State University, University Park, Pennsylvania.

Midwestern Association
Kansas City (Mo.) May 15th

The Midwestern Association will hold its regular monthly meeting at "Loose Park Garden Center," 5200 Pennsylvania Ave., Kansas City, Missouri, 2:30 P.M., Sunday, May 15.

Refreshments will be served. Everyone welcome.

James A. Worrell, Secretary

South Arkansas Association
Camden, June 6th

The South Arkansas Association will meet at the Fairview School (Cullendale), Camden, Saturday, June 6th. It will be a Field Day with demonstrations; basket dinner and fellowship. Every beekeeper should share in this together.

Mrs. Cathy Barton,
Secretary

Middlesex County (Mass.)
Weston, May 21st

The first 1960 outdoor meeting of the Middlesex County Association will be held on Saturday May 21 on the estate of Mrs. Stephen S. Fitzgerald, 2 Newton Street, Weston, at 2 P.M.

Members will look through the hives of Mrs. Fitzgerald's apiary and the club hive will be inspected to see how it has progressed since the April meeting when it was installed.

A business meeting will be held before the picnic supper. A charcoal grill will be available for those who wish to cook.

M. Southwick, Corres. Sec.
176 Waban Avenue, Waban 68, Mass.

Minnesota's 18th Annual Short Course
Univ. of Minnesota, May 6th and 7th

PROGRAM

Friday, May 6—307 Coffey Hall

A.M.

8:00—Registration

9:15—
What should we know before starting with bees?—M. H. Haydak.

10:00—
The advantages of beekeeping as a hobby.—C. D. Floyd, State Apiarist, Division of Plant Industry, Department of Agriculture, Dairy and Food

11:00—
Feed your bees right (with demonstrations).—M. H. Haydak

P.M.

12:00—Lunch

1:30—
Value of bees to agriculture; should every farmer be a beekeeper?—K. W. Tucker

2:30—
First steps in beekeeping; equipment, assembly, choice of proper site. —C. D. Floyd
Tucker

3:30—Meet the queen.
M. H. Haydak, K. W. Tucker

Friday evening

7:00—
Know your honey. — Barbara B. North

8:00—

How to present your honey at its best. (showmanship and marketing.) —Helen Bunch

Saturday, May 7—307 Coffey Hall

A.M.

9:00—

Swarming and what to do about it.—M. H. Haydak

10:00—

Preparing for the honeyflow. — C. D. Floyd

11:00—

What should we know about bee diseases and their control?—M. H. Haydak, C. D. Floyd

P.M.

12:00—Lunch

1:30—

Honey grading, in laboratory.—M. H. Haydak

Installing packages, handling colonies in the apiary.—C. D. Floyd

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6th Annual, Eastern Apicultural Society Rutgers University, New Brunswick, New Jersey, June 23 - 25

The Eastern Apicultural Society will hold its 6th annual meeting on June 23, 24, and 25 at Rutgers University in New Brunswick, New Jersey.

The program will be much the same as in past years with outstanding speakers and demonstrations which should be of interest to all. There will also be an entertainment program and it is hoped that beekeepers will bring their wives and children with them. As in the past, persons attending the meetings will be housed in the University dormitories.

There are no geographical limitations on membership in the Eastern Apicultural Society and last year's meeting was attended by over 400 people from Florida to Ontario.

Roger A. Morse,
Walter Morrison,
Publicity Committee

Pennsylvania Correspondence Courses

Beekeepers in Many States and in Other Countries Enjoy Them

516 lessons on beekeeping were processed in the past twelve months by Correspondence Courses in Agriculture of The Pennsylvania State University according to Professor Walter L. Haldeman. The survey made indicates that there is a widespread interest in beekeeping courses since students from 17 states and 2 foreign countries enrolled.

The foreign countries represented were Canada and Chile. The enrollee from Chile evidently is a missionary teacher since he mentions that his students have lively discussions about the information contained in the course.

States represented include Pennsylvania, Arkansas, California, Connecticut, Oklahoma, Illinois, Kansas, Iowa, Nevada, Indiana, New York, New Jersey, Ohio, Mississippi, Tennessee, Texas and Nebraska. Pennsylvania had the largest enrollment followed by Texas, New Jersey, New York and Iowa.

Correspondence Courses are open to anyone. To enroll in this particular course send a check or money order in the amount of $2.50 payable to The Pennsylvania State University to Correspondence Courses in Agriculture & Home Economics, 202 Agricultural Education Building, University Park, Pennsylvania and request Course 70. A free bulletin describing this and 70 other courses offered by The Cooperative Agricultural Extension Service is available from the same address.

Dr. Drescher Here for a Year and a Half

Dr. Wilhelm Drescher of the Institute for Beekeeping, University of Bonn, Bonn, Germany, is currently spending a year and a half in the United States under the sponsorship of the Deutschen Forschungsgemeinschaft. He arrived at Iowa State University in Ames in the spring of 1959 and will stay until late summer of 1960. He is accompanied by his wife, Dr. Angela Drescher.

Dr. Drescher's purpose is to become familiar with modern genetic concepts and to conduct research on honey bee genetics in collaboration with Dr. Walter C. Rothenbuhler and associates. While working in Bonn with Professor G. Goetze, Drescher had used the technique of artificial insemination for certain studies on genetics of honey bees. In America, he is continuing to use this technique for experiments involving the special genetic stocks available at Ames to study gynandromorphism and developmental genetics in bees.

The Dreschers hope to travel more extensively in this country and visit a number of laboratories of apiculture and genetics before returning to Germany.

Technique for Genetics— Rothenbuhler (page 176)

larly accessible in bees. It promises to be powerful in the selection of genotypes for specific behavior patterns.

Epilogue

When the editor asked for this article, he wanted it to deal with "Some Avenues of Approach to the Future." The above is my response. It may be summarized as more study of genetics; more study of behavior (especially in America); but most important, study in a new field—a field combining the two and using the *inbred queen-single drone* mating technique outlined. Researches on genetics of behavior in bees seem likely to be of practical value to apiculture and of theoretical value to the sciences of behavior, genetics, and evolution.

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BRIGHT ITALIANS: 3 lb. with queen $5.00, 2 lb. with queen $4.50, f.o.b. Aberdeen, queens $1.50. Sheppard Apiaries, Aberdeen, North Carolina.

QUALITY ITALIAN queen bees—Until June 1st, each $1.25, 5 or more $1.20 each, 25 or more $1.15 each. Write for package bee prices. A. G. Woodman Co., Grand Rapids, Michigan or Lena, S. C.

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YOUNG MAN FOR bee work, and able to haul bees north, and handle trucks; steady work for good man. Geo. Gessner, 1010 Miller Ave., Mission, Texas.

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WANTED PRODUCERS of light clover honey to super chunk comb frames for us 1960. Write Mayhew Honey Farms, Clarkson, Kentucky.

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RANCH MAGAZINE—Do you find it difficult to secure information about sheep and sheep ranching methods? The SHEEP AND GOAT RAISER reaches more sheepmen with more information of range sheep than any magazine published. Subscription 1 yr., $3.00; sample copy 25c. Box 189, San Angelo, Texas.

The Australasian Beekeeper—The senior beekeeping journal of the Southern Hemisphere provides a complete cover of all beekeeping topics in one of the world's largest honey producing countries. Published monthly by Pender Bros. Pty. Ltd., Box 20, P.O. Maitland, 3N, N.S.W., Australia. Subscription by Bank Draft or International M.O. Australia or New Zealand 16'-($2.00) per annum (in advance) postpaid. British Isles and British Dominions 20'-($2.50) per annum (in advance) postpaid. Other overseas countries 23/-($2.90) per annum (in advance) postpaid.

Dr. Jarvis New Book entitled "Folk Medicine" is already in its 12th printing has fine chapter on Honey and Cappings use in sinus trouble, infant feeding, sleep inducing, bedwetting, for coughs, burns, cramps, hayfever, athletes' nutrition, etc. Cloth, 180 pages, postpaid $3.00. American Bee Journal, Hamilton, Illinois.

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Books on fur farming. Muskrat Farming, by Jas. L. Edwards, $3; Raccoon Raising by Jas. Edwards $2.50; Mink Farming, by Jas. Edwards $2; Raising Chinchillas for Profit by G. R. Schwab, $3.50; The Books of Wild Pets, by C. B. Moore, $6.50. We furnish any book or magazine on Fur Farming. Send for a complete list. Address all orders to Fur Farms Publishing Co., 1508 Howard Ave., Utica 3, New York.

My last few books, Honey In the Comb have been purchased by the American Bee Journal and Gleanings In Bee Culture. If you want a copy order direct from them. Carl E. Killion, Paris, Illinois. (Price of these books is $3.00 postpaid-ABJ)

WE ARE SHORT of 1960 issues for library calls. Will give two months subscription for copies of each Feb. and March 1960 issues. American Bee Journal.

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Crop and Market

by M. G. Dadant

CONDITION OF BEES

As could be very evident from the weather preceding the date of our report cards, condition of bees was naturally delayed on account of the extremely prolonged spell of snowy, cold weather. The entire South had experienced weather which was abnormal and which no doubt made it extremely difficult not only for the commercial beekeepers to get their bees in satisfactory condition for the early honeyflows, but also for the package shippers to build their colonies to the point where they could "rob" them of packages for shipment to northern areas. However, it does seem that when the weather did break, conditions were extremely favorable and package shippers were not too far behind on orders, even for the early bookings.

In northern areas, bees had really come out of winter with more colonies alive than had been anticipated by the writer although in the farther northern territories and the Canadian provinces, the long confinement had been conducive to more than normal losses. Where bees are amply supplied with honey and reasonable protection, however, losses were not too heavy, ranging from 5% in most cases to as high as 25 to 50 per cent where conditions during the fall had been unfavorable.

WINTER LOSS

As stated above, winter losses have varied considerably, ranging all the way from a normal 2 to 5 per cent to as high as 25 to 50 per cent in those areas where bees were not sufficiently provided by ample stores and strong colonies of young bees to meet the specially confining winter.

One point which was covered only in part by our reports was that, although the actual winter losses of colonies was not excessive in most cases except in the far northern areas, there were more than the average number of weak colonies coming out of winter and this, of course, would signify that there may be an unusual number of "spring dwindling" losses of colonies because the remaining cluster of bees will not have been sufficient to cover brood for replenishing and the old bees would die off before the new colony could reinvigorate itself.

Altogether, we anticipate considerably more than the average winter and spring loss and the necessity for making this up preferably by package bees from the South.

One condition in favor of possibilities of replenishment is the fact that all conditions were delayed, namely honey plants, as well as bee colonies, so that likely early bloom will be delayed. In fact this has been true in the southern areas.

HONEY PLANTS

Owing to the excessive winter moisture and heavy snows which covered much territory without too much subsoil freezing, we find that in practically all areas there is ample moisture for the spring. Some sections are a little under. This applies to parts of Arkansas, to Wyoming, to Idaho, Utah and Nevada.

However, this is in part recompensed by the fact that snows in the mountains have been exceedingly good this year and bode well for the irrigated sections to have ample water for irrigation during the coming summer. A good snow coverage for winter, particularly in the Dutch white clover and sweet clover areas, means that the honey plants should have come through in excellent condition and in our own instance in the central territory, we find that the little Dutch white clover does look unusually well with very little winter heaving and winter loss.

THE CANADIAN PROVINCES

They report a "hard winter." This will mean losses particularly in those areas where overwintering of colonies is practiced and this, of course, applies to all the eastern provinces of Canada. Farther west probably much of the colony numbers are killed off in the fall and replenished by packages in the spring. The late spring, of course, will work well with the somewhat delayed conditions in the South so that delays on account of unavailable packages should be minor.

HONEY HARVEST

Already we get reports of the honey harvest for 1960. It appears that the Florida crop of orange honey has been unusually good this year and probably would have broken all records had it not been for the slow build-up of the colonies on account of the delayed cold weather leading up to the orange bloom.

In the Pacific coast areas, orange has been quite satisfactory as have the minor spring crops although catching the colonies far under the usual and desired condition for a honeyflow.

Reports of moisture in the Pacific coast dryland areas would indicate that surface moisture is much better than a month ago but very little moisture to "go on" and it's a possibility that the dryness will intensify and will prevent anything like a crop which was apparent in the early spring of 1958. 1959, of course, can certainly be surpassed inasmuch as all conditions were unfavorable in the dry eastern areas of the Pacific mountain states.

All in all, bees are, we believe, two or three weeks behind and far under normal conditions for this season of the year, both as to losses and the possibilities of spring dwindling. On the other hand, the moisture and honey plants are far better than is the average and where colonies can be built up into condition for the honeyflow, it looks like their possibilities should be good.

HONEY ON HAND

Already reported is the fact that practically all honeys under loan will have been redeemed before the closing date of April 30.

The orange honey in Florida is now ready for sale and we understand that quotations are being made at a rate of 13 cents to 15 cents per pound f.o.b. shipping station in Florida.

Also many lots of white honey available in the northern and intermountain states are being rapidly "gobbled up" by small and large packers alike who want enough honey to carry them through until the new crop. In fact the price is now as high as 14 to 15 cents which is being paid for these miscellaneous lots, one packer now offering in a circular letter a price of 14 cents f.o.b. producer's point.

It is unfortunate that some producers are so hasty in wanting to sell their honey as to take prices as low as 10½ to 12½ cents earlier in the season. Neither the crop nor the carryover did not warrant such a pessimistic outlook on what prices might be.

(Please turn the page)

We hope that the new crop coming on will meet a good reception on the part of the packers and that the beekeepers themselves who are largely responsible for low prices may hold until at least they see where the market lands. One big packer early last season we recall offered 13 cents for honey in the central and intermountain areas which should have set the pace for honey prices generally. However, price cutting on the part of some other packers and a willingness to succumb to such quotations, did disturb the market very greatly and resulted in many beekeepers getting below what they should have gotten for the 1959 crop

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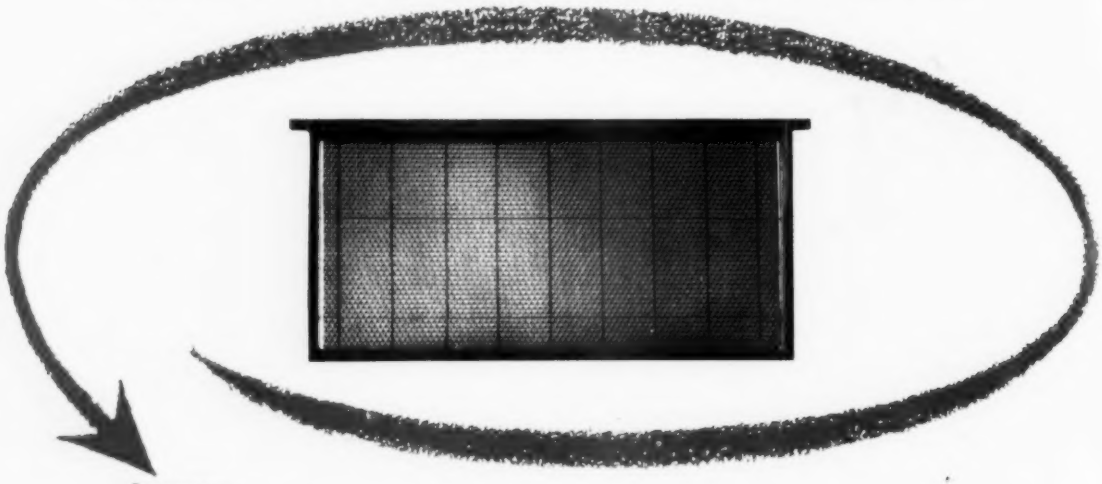

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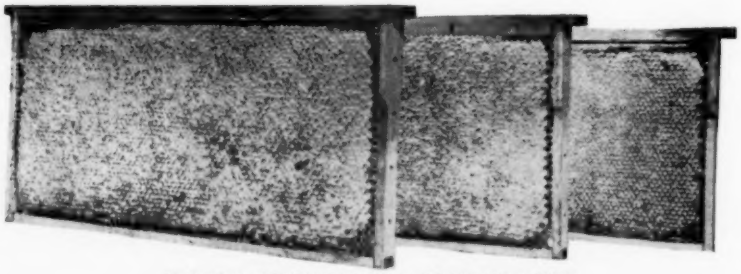

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